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Environmental Protection Agency

May 1976

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This document is the final Environmental Impact Statement prepared in conjunction with the Central Kitsap County Draft Facilities Plan. The EIS was written as a part of the proposed Kitsap County grant for the construction of interceptor sewer lines, wastewater treatment facility and wastewater disposal facility to serviee the Trident Submarine Support Site and the Poulsbo drainage basin.

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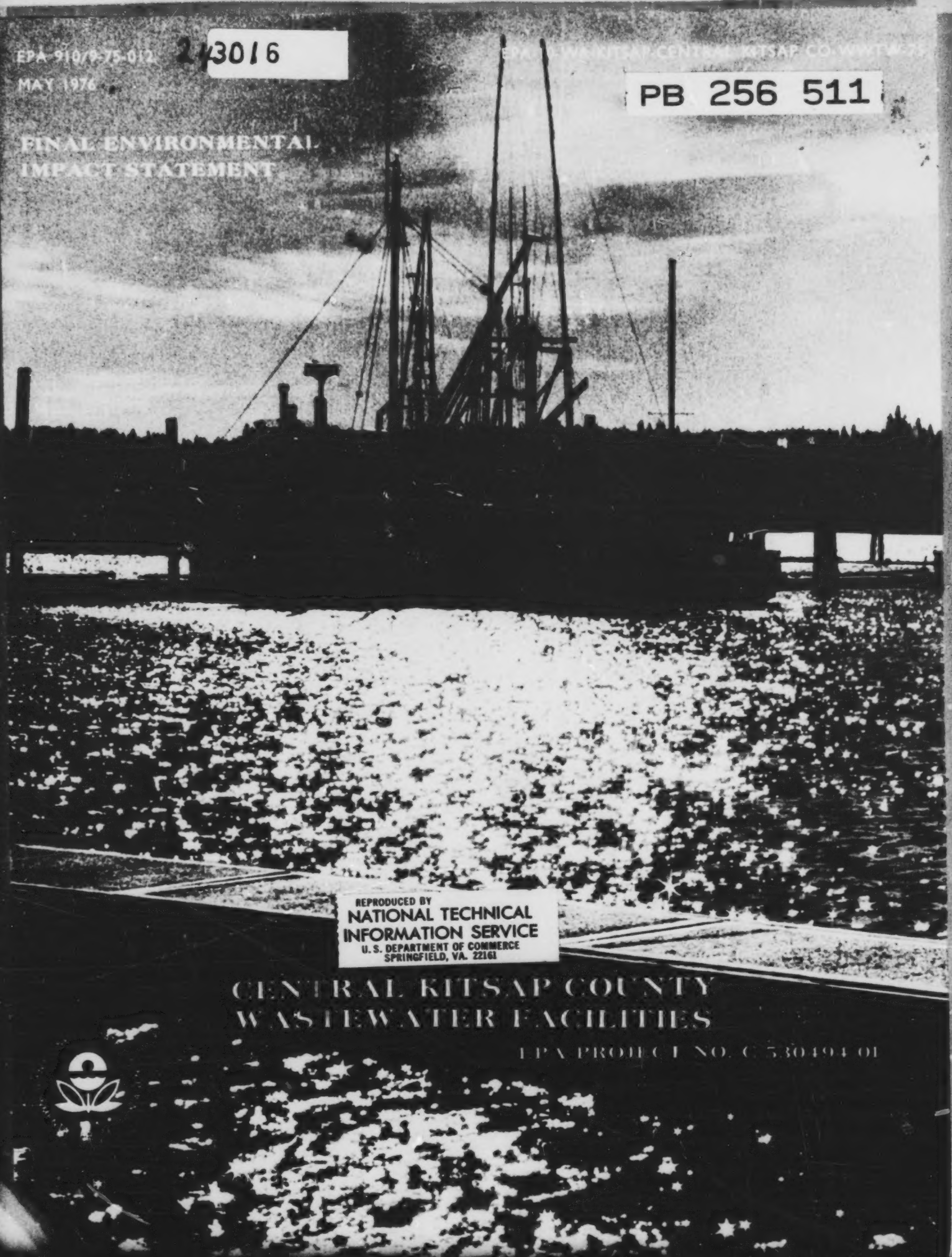
FINAL ENVIRONMENTAL IMPACT STATEMENT



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CENTRAL KITSAP COUNTY WASTEWATER FACILITIES

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FINAL

ENVIRONMENTAL IMPACT STATEMENT

for

WASTEWATER FACILITIES
Kitsap County, Washington

prepared by

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

SEATTLE, WASHINGTON 98101

with the assistance of

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MAY, 1976

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April 22, 1976
Date

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SUMMARY SHEET

CENTRAL KITSAP COUNTY WASTEWATER FACILITIES
KITSAP COUNTY, WASHINGTON
EPA PROJECT NO. C-530494-01

ENVIRONMENTAL IMPACT STATEMENT

Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

1. Type of Statement: Draft ( ) Final (x)

2. Type of Action: Administrative

3. The subject action for this environmental impact statement is the awarding of grant funds to Kitsap County, Washington for the construction of interceptor sewer lines, wastewater treatment facility and wastewater disposal facility to service drainage sub-basins 9 and 10, the Trident Support Site and the Poulsbo drainage basin. The present estimate of project construction cost is $18,026,000. The County's Facilities Plan, dated March 1976, was used by EPA as a major resource document for the preparation of this environmental impact statement.

4. The recommended project is the eleventh of eleven alternatives evaluated in this EIS.

The proposed project would result in: (1) the elimination of poorly treated effluent from Dyes Inlet; (2) discontinuance of the use of septic tanks in unsuitable soils in the sewerage area; (3) a reduction of bacterial pollution of water supply wells and marine waters in the study area; and (4) provide a mechanism for locating anticipated growth within the study area.

Major primary adverse impacts and mitigative measures associated with the proposed project are:

(1) Installation of sewerage interceptor system will disrupt vegetation and wildlife habitat. Construction of outfall through shoreline bluffs could promote erosion. A grant condition will assure revegetation of disturbed areas and tunneling of the treated effluent outfall through the bluff area.

(2) In cases where interceptor sewers traverse areas reserved for low growth, pressures for development may occur with the influx of Trident population. The citizenry is encouraged to continue active participation in the zoning process.

(3) Installation of a sewerage system with porous backfill could create a drain by which the shallow groundwater could escape, lowering water levels in shallow dug wells, a major potable water supply source. A grant condition will require clay dams at every manhole along sewer lines that traverse high groundwater areas in order to reduce draining of the sewered areas.

(4) The community of Island Lake would not receive sewerage service under this project. A grant condition will require a nearby interceptor to have adequate capacity for a future connection from Island Lake.

(5) Wastewater to be received from the Trident Support Site has not been fully characterized. The wastewater treatment contract between the U.S. Navy and Kitsap County will specify maximum waste constituents allowable from the Trident Support Site.

(6) In order to assure a satisfactory technical basis for design of the outfall diffuser section for the proposed outfall site, a comprehensive current metering study should be performed during the early design stages of the project. The results of this study will enable the designer to maximize initial mixing and dilution of the treated effluent. This study will be required by the use of a grant condition.

5. The following Federal, State and local agencies and interested parties were invited to comment on this environmental impact statement.

FEDERAL AGENCIES

Council on Environmental Quality
U.S. Department of Agriculture
U.S. Department of Defense, Department of the Army, Corps of Engineers
U.S. Department of the Interior, Office of Environmental Projects
U.S. Department of the Interior, Fish and Wildlife Service
U.S. Department of Health, Education and Welfare, Region X
U.S. Department of Housing and Urban Development, Region X
U.S. Department of Transportation, Region X
Advisory Council on Historic Preservation
Bureau of Indian Affairs

MEMBERS OF CONGRESS

Henry M. Jackson, U.S. Senate
Warren G. Magnuson, U.S. Senate
Brock Adams, U.S. House of Representatives

REGIONAL AND LOCAL AGENCIES

Puget Sound Governmental Conference
Puget Sound Air Pollution Control Agency
River Basin Coordinating Committee
Kitsap County
Port of Brownsville
City of Bremerton
City of Poulsbo
Suquamish Tribal Council
Western Division, Naval Facilities Engineering Command

INTERESTED GROUPS

Audubon Society
Friends of the Earth
League of Women Voters of Puget Sound
Northwest Steelheaders Council of Trout Unlimited
Sierra Club
Steelhead Trout Club of Washington
Washington Air Quality Coalition
Washington Environmental Council
Lemolo Citizens Club, Inc.
CH2M/Hill, Inc.

The draft EIS was made available to the Council on Environmental Quality (CEQ) and the public in December 1975. The final EIS was made available to CEQ and the public on May 21, 1976.

I INTRODUCTION & SUMMARY

CHAPTER I

INTRODUCTION AND SUMMARY

This document is the Final Environmental Impact Statement prepared in conjunction with the Central Kitsap County Draft Facilities Plan (References 1 and 61). It is written to present to the reviewing public and agencies the preferred wastewater management alternative, developed after extensive evaluation and comparison with other alternative plans. In this context, the Final Environmental Impact Statement is an integral part of both a process and a document, commencing with the Draft Environmental Impact Statement. Alternative descriptions and impacts thoroughly explored in draft documents will not be repeated here. This report presents a summary comparison of all 11 original alternatives, a detailed description of the environmental setting, a description of the preferred alternative and analysis of its environmental impacts, and responses to public comments on the Draft and Draft Supplement Environmental Impact Statements. For further information on the 10 rejected alternatives and the evaluation process which led to the selection of one plan, the reader is urged to refer to the draft statements.

The Draft Facilities Plan was released for public comment in July 1975. The Draft Environmental Impact Statement release followed in September 1975. Since that time, several major ongoing studies of receiving water quality and population growth have been completed. The results of the studies are incorporated into the Supplement to the Draft Facilities Plan, released in December 1975.

The Environmental Impact Statement for Central Kitsap County's wastewater facilities was prepared concurrently with the Facilities Plan. Thus, refinement of the Facilities Plan between the draft and final document stages resulted in changes in the environmental impact statement, and a Supplement to the Draft Environmental Impact Statement was released in February 1976.

BACKGROUND

This environmental impact statement fulfills EPA's responsibility under the National Environmental Policy Act of 1969. It is based upon information supplied in the Facilities Plan and on-site data collection. Although an effort was made to avoid duplication of information from the Facilities Plan, the document is intended to be self-supporting and to provide sufficient background material.

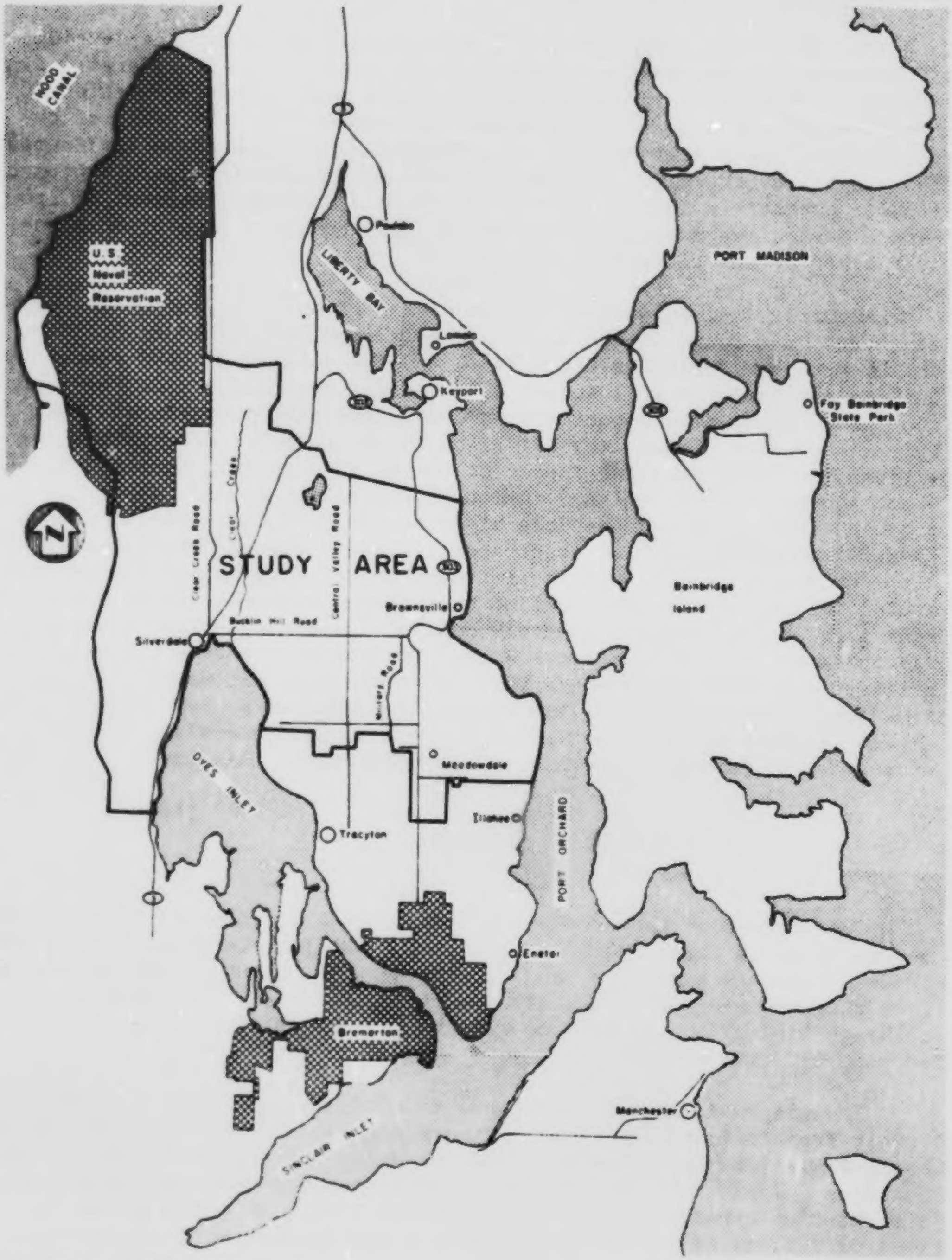
The study area, shown on Figure I-1, is on the Kitsap Peninsula on Puget Sound, due west of Seattle. The area has experienced numerous failures of septic fields due to hydraulic overloading, high groundwater levels and soil characteristics which are unsuitable for disposal purposes. Increases in population growth would only magnify these problems. Other areas of concern within the county are the bacteriological contamination of freshwater streams, lakes and water supplies, as well as of marine waters in the area. The Facilities Plan identifies the following areas as having reported problems: Island Lake, Brownsville, Dyes Inlet, Port Washington Narrows, Salmonberry Creek, Barker Creek, Clear Creek, Silverdale Creek, Burke Bay and Fletcher Bay. Specific areas where freshwater supplies have shown some bacterial contamination at their sources are Dawn Park, Eldorado Water, North Perry Water District, Silverdale, Apex Airport and Clear Creek Mobile Home Park.

The only existing municipal sewage treatment plant in the study area is in Silverdale, providing primary level treatment to locally originating wastewater prior to discharge to Dyes Inlet.

A new Trident Submarine Support Site, to be constructed in the Bangor Naval Annex, will bring an estimated 31,600 persons into the region beyond normal growth and a total of 22,500 persons are expected to reside in the study area. Wastewaters from this population would far exceed the capability of the Silverdale Sewage Treatment Plant and would greatly intensify all of the sewerage-related problems in the study area. The existing sewage treatment facilities at the Trident Support Site would also be unable to accommodate this large influx of population.

Federal regulations require secondary level wastewater treatment at all sewage treatment plants by 1977. Thus, not only would capacity have to be expanded for the existing facilities but a higher level of treatment would be required at Silverdale. These problems combine with the sudden change in population growth in the study area to produce a unique situation in which wastewater treatment facilities may be planned literally from the beginning, without a commitment to use outdated existing facilities.

The development of the Facilities Plan began in 1973 with a plan for interceptor sewers and wastewater treatment facilities to serve Brownsville, Silverdale and Meadowdale, in Kitsap County. The announced intent of the U.S. Navy to develop a submarine support base (Trident Support Site) at the Bangor Naval Annex, with an attendant large influx of population, produced a realization that wastewater management plans for the study area should include provision for this population. Therefore, in February of 1975 Kitsap County authorized the URS Company to develop a Facilities Plan for wastewater collection, treatment and disposal within drainage subbasins 9 and 10 and to consider wastewaters generated at the Trident Support


HOOD CANAL
U.S. Naval Reservation
Poulsbo
LIBERTY BAY
PORT MADISON
Lemolo
Keyport
Fay Bainbridge State Park
Clear Creek Road
Clear Creek
Central Valley Road
STUDY AREA
Brownsville
Bainbridge Island
Bucklin Hill Road
Silverdale
Military Road
DYES INLET
Meadowdale
Illahee
Tracyton
PORT ORCHARD
Enetai
Bremerton
Manchester
SINCLAIR INLET

Source: Reference 1

Figure I-1. Study area location

Site. The U.S. Navy has also expressed the desire to transport wastewaters to the County treatment system.

The Facilities Plan defines 11 alternative plans for the development of sewerage and wastewater treatment facilities in the study area. Since the basic impetus for producing a facilities plan is the protection of man's social and natural environments, a comparative evaluation of the alternative plans must address all relevant aspects of those environments. This is one of the major functions of the environmental impact statement (EIS). Another is to provide to the public a concise statement of project alternatives and to assure that no environmental impact has been overlooked by the planner.

Authority and guidelines for the preparation of environmental impact statements are found in the National Environmental Policy Act of 1969, implemented by Executive Order 11514 and the Council on Environmental Quality's Guidelines of 1 August 1973. Final regulations for the preparation of environmental impact statements by EPA were published in the Federal Register, Volume 40, No. 72 on 14 April 1975. Under these regulations, an "environmental impact statement is a report, prepared by EPA, which identifies and analyzes in detail the environmental impacts of a proposed EPA action and feasible alternatives." With regard to Kitsap County, municipalities and local agencies are required, when planning for construction of publicly owned treatment works, to evaluate the environmental impacts of the construction and subsequent operation of the treatment works and to prepare an environmental assessment. This assessment was presented in the Facilities Plan. The EPA must review the assessment, collect corroboratory evidence when necessary and, ultimately, issue a negative declaration or, if the project is expected to have significant adverse primary or secondary effects or to be controversial, prepare an environmental impact statement, as has occurred in this case.

BASELINE

The impacts of the proposed project take the existence of the Trident Support Site as their starting point. The decision to proceed with the Trident base has been made, and construction has begun. Impacts resulting from this decision have been assessed, published and officially accepted, although litigation against the Trident project is in progress in Washington, D.C. (Reference 2).

The proposed project will serve to mitigate some impacts expected to result from Trident, and might increase others. The reader is urged to keep in mind the basis on which the following environmental impacts were assessed: Impacts of the proposed project take as their starting point the existing conditions *and* conditions which will obtain when the full impact of Trident is felt. If for some reason Trident were not to proceed, the entire Facilities Plan would require reassessment.

SUMMARY

Of the 11 alternatives addressed in this Environmental Impact Statement, 10 were distinguished by service area, treatment facility location and marine disposal site. The eleventh involved a basically undeveloped concept of land disposal of treated effluent. A no-project alternative was addressed and eliminated in a preliminary screening in the Draft Facilities Plan. The summary contains a brief description of each alternative and addresses the *major* issues of the project. These issues have been identified as: population growth inducement due to the availability of sewerage service, as well as the location of that population; economic impact on the community from facility construction, operation and maintenance costs; the effects on marine water quality due to the treated effluent outfall location; pipeline construction and growth inducement along the Clear Creek corridor; and expected benefits from implementation of a wastewater management system. The alternative plan numbers are correlated in Table I-1 with those of the Draft Facilities Plan, and the locations of treatment plant and outfall sites are shown in Figure I-2.

Alternative Plans

Alternative Plan No. 1

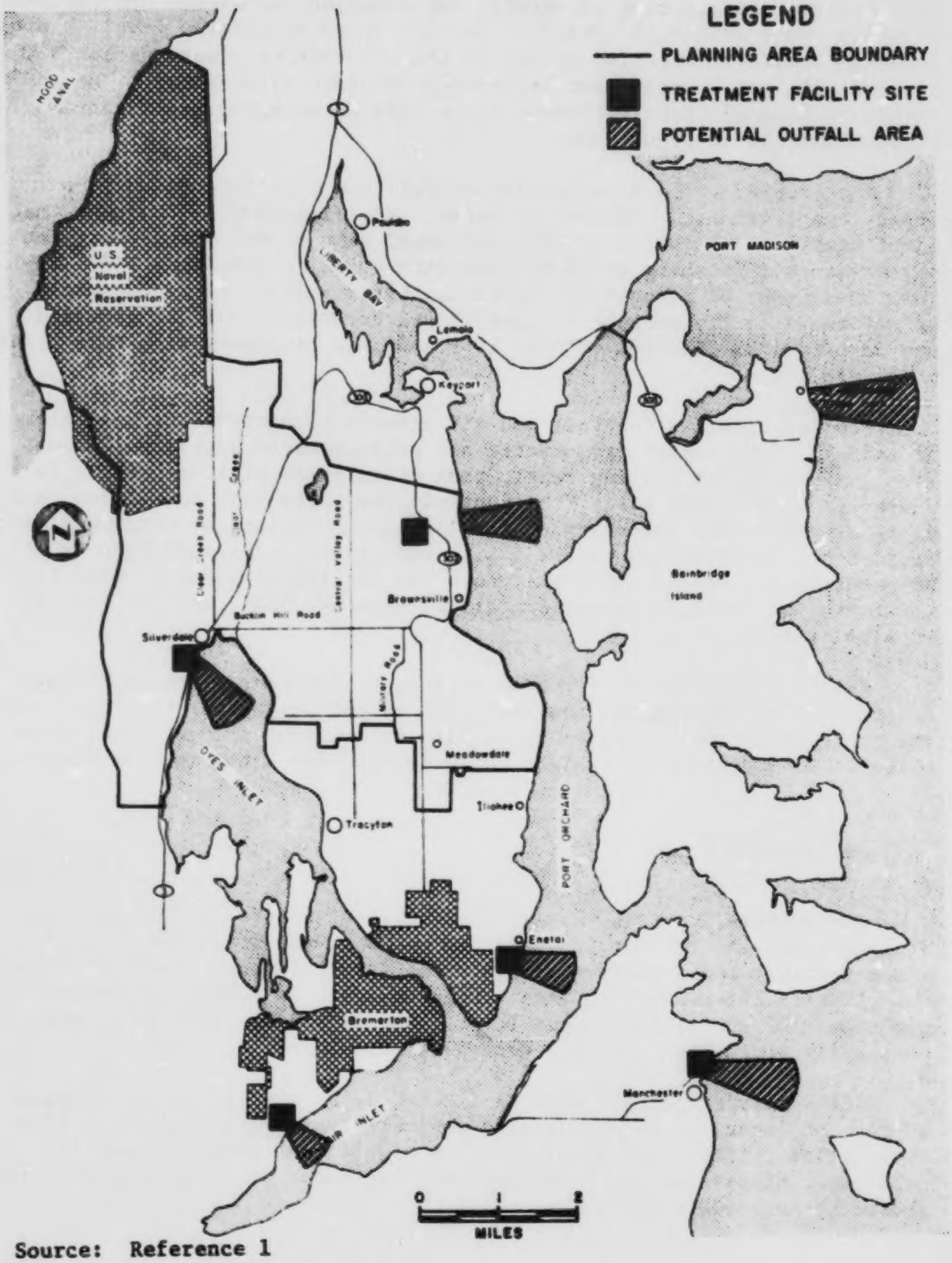
Wastewaters from sub-basins 9 and 10 and the Trident Support Site would be collected and treated at a new tertiary level wastewater treatment facility located near the present plant in Silverdale. Treated effluent would be discharged through a new submarine outfall into Dyes Inlet. The Silverdale site is an aesthetically poor location for a wastewater treatment facility because of its shoreline location and high visibility.

It has been concluded that population growth within the study area and associated demands upon utilities and municipal services will be primarily due to the development of the Trident Support Site and that project-induced growth will be negligible. The sewerage systems of each alternative will have the tendency to concentrate future growth near sewer lines, and this fact can be used by County planners to aid in controlling growth within the study area. This impact is identical for all subsequent alternative plans and will not be addressed again.

The placement of a proposed pipeline along Clear Creek, for the transport of Trident Support Site wastewaters, will have some negative

Table I-1. WASTEWATER TREATMENT AND DISPOSAL ALTERNATIVES

Facilities Plan reference no.	Plan no.	Service area	Treatment facility site	Discharge site
(1)	1	Sub-basins 9 and 10 Trident facility	Silverdale	Dyes Inlet
(1P)	2	Sub-basins 9 and 10 Trident facility Poulsbo facilities planning area	Silverdale	Dyes Inlet
(3)	3	Sub-basins 9 and 10 Trident facility	North Brownsville	Bainbridge Island
(3P)	4	Sub-basins 9 and 10 Trident facility Poulsbo facilities planning area	North Brownsville	Bainbridge Island
(4)	5	Sub-basins 9 and 10 Trident facility	North Brownsville	northern Port Orchard channel
(8)	6	Sub-basin 9 and Trident facility	Silverdale	Dyes Inlet
		Sub-basin 10 and Bremerton planning area	Bremerton	Sinclair Inlet
(9A)	7	Sub-basins 9 and 10 Trident facility Bremerton planning area	Bremerton	Sinclair Inlet
(10A)	8	Sub-basins 9 and 10 Trident facility Bremerton planning area	Enetai	Port Orchard channel at Enetai
(11A)	9	Sub-basins 9 and 10 Trident facility Bremerton planning area	Manchester	Manchester
(17)	10	Sub-basins 9 and 10 Trident facility	not chosen	Land disposal sites not chosen
(4A)	11	Sub-basins 9 and 10 Trident facility Poulsbo facilities planning area	North Brownsville	northern Port Orchard channel


LEGEND
PLANNING AREA BOUNDARY
TREATMENT FACILITY SITE
POTENTIAL OUTFALL AREA
HOOD CANAL
U.S. Naval Reservation
Poulsbo
LIBERTY BAY
PORT MADISON
Lemolo
Keyport
Clear Creek Road
Central Valley Road
Bucklin Hill Road
Brownsville
Bainbridge Island
Silverdale
Military Road
Meadowdale
DYES INLET
Tracyton
Illahee
PORT ORCHARD
Enetai
Bremerton
Manchester
INLET
0
1
2
MILES

Source: Reference 1

Figure I-2. Location of alternative elements.

impacts on vegetation, aesthetics and stream ecology. It was determined that diligent application of careful construction techniques and reforestation could reduce the negative impacts to an acceptable level. This issue is similarly affected by all of the alternative plans, except No. 11, and will not be addressed separately for each alternative. The potential for population settlement along this interceptor has received substantial public opposition.

The treated effluent submarine outfall would be located in Dyes Inlet in approximately 40 feet of water. Modeling results indicate that first mixing and dilution of effluent would be poor and that subsequent dispersion and flushing would be fair with the site providing 100:1 dilution at least 61 percent of the time. Water quality criteria should be met consistently because tertiary level treatment would be provided and an estimated dilution of only 10:1 would be necessary with this treatment level.

Project benefits for this and all other alternatives are basically identical. Substantial groundwater and potable water supply pollution from inadequate and failing septic tank drainfields will be greatly reduced. Public health risks from contaminated wells will be reduced, and it is expected that secondary or tertiary level wastewater treatment with appropriate disinfection measures will reduce bacterial pollution in all adjacent marine waters and may improve the quality of water in Dyes Inlet. These project benefits accrue for all alternative plans and will not be repeated subsequently.

This alternative was rejected because of the poor dispersion characteristics of Dyes Inlet, the high cost of tertiary level treatment and the location of the Trident Support Site interceptor through Clear Creek Valley. A comparison of project costs is provided later in this Chapter.

Alternative Plan No. 2

Wastewaters from sub-basins 9 and 10, the Poulsbo facilities planning area and the Trident Support Site would be collected and treated at a new tertiary level wastewater treatment facility located near the present plant in Silverdale. Treated effluent would be discharged through a new submarine outfall into Dyes Inlet. The Silverdale site is an aesthetically poor location for a wastewater treatment facility.

The submarine outfall will be located in Dyes Inlet in approximately 40 feet of water. Modeling results indicate that, with additional flow from Poulsbo, first mixing and dilution of effluent would be poor and subsequent dispersion and flushing would be fair. Water quality criteria should be met consistently.

This alternative was deemed unacceptable because of the poor dispersion in Dyes Inlet, the high cost of tertiary level treatment and the location of the Trident Support Site interceptor through Clear Creek Valley.

Alternative Plan No. 3

Wastewaters from sub-basins 9 and 10 and the Trident Support Site would be collected and treated at a new secondary level wastewater treatment facility located near Brownsville. Treated effluent would be pumped to Lemolo, from which point it would be pumped to Point Monroe on Bainbridge Island. An outfall southeast of Point Monroe would discharge the treated effluent into Puget Sound. The Brownsville site is well screened and aesthetically acceptable for a treatment facility.

The submarine outfall has not yet been designed. Initial modeling results indicate that first mixing and dilution of the effluent would be excellent and subsequent dispersion and flushing would be good, with the site providing 100:1 dilution 100 percent of the time. Water quality criteria should be met consistently.

Although this alternative was preferable to alternative No. 11, the improvement in environmental benefits was marginal and insufficient to justify the higher cost.

This alternative was evaluated with the Trident Support Site interceptor located in Clear Creek Valley. Removal of this interceptor to the routing of alternative No. 11 would still not make the higher cost of a Point Monroe outfall justifiable.

Alternative Plan No. 4

Wastewaters from sub-basins 9 and 10 and the Trident Support Site would be collected and treated at a new secondary level wastewater treatment facility located near Brownsville. Treated effluent would be pumped to Lemolo, where treated effluent from a proposed Poulsbo facility would join the flow. The combined effluents would be pumped to Bainbridge Island and discharged through a submerged outfall southeast of Point Monroe. The Brownsville site is well screened and aesthetically acceptable for a treatment facility.

The submarine outfall has not yet been designed but is expected to reach at least a 165-foot depth. Modeling results indicate that first mixing and dilution of the effluent would be excellent and subsequent dispersion and flushing would be good. Water quality criteria should be met consistently.

This alternative provides for common disposal for the Poulsbo and Brownsville treatment plants but does not provide the cost benefits of regionalization with a common treatment facility. The high cost of the Point Monroe outfall and the Clear Creek location of the Trident Support Site interceptor make this alternative less desirable than No. 11.

Alternative Plan No. 5

Wastewaters from sub-basins 9 and 10 and the Trident Support Site would be collected and treated at a new secondary level wastewater treatment facility located near Brownsville. Treated effluent would be discharged through a submerged outfall into north Port Orchard channel. The Brownsville site is well screened and aesthetically acceptable for a treatment facility.

The submarine outfall would be located in approximately 40 feet of water in north Port Orchard channel. Modeling results indicate that first mixing and dilution of the effluent would be fair and subsequent dispersion and flushing would be good. This site would achieve at least 100:1 dilution 71 percent of the time and at least 10:1 dilution would be met 95 to 99 percent of the time. With provision for increased coliform removals, secondary effluent could reach class AA standards with only 10:1 dilution.

This alternative had major disadvantages in that it involved using the Clear Creek interceptor for Trident wastes and that it did not maximize the benefits of regional treatment because it excluded Poulsbo's waste.

Alternative Plan No. 6

Wastewaters from sub-basin 9 and the Trident Support Site would be collected and treated at a new Silverdale wastewater treatment facility. Treated effluent would be discharged to Dyes Inlet through a submerged outfall in approximately 40 feet of water. The Silverdale site is an aesthetically poor location for a treatment plant.

Modeling results on Dyes Inlet indicate that first mixing and dilution of the effluent would be poor and subsequent dispersion and flushing would be fair.

Wastewaters from sub-basin 10 and the Bremerton planning area would be collected and treated at the newly renovated and expanded Charleston Sewage Treatment Plant. Treated effluent would be discharged to Sinclair Inlet through a submerged outfall. The Charleston site would be aesthetically acceptable for expansion.

Modeling results on a 35-foot deep outfall in Sinclair Inlet show that first mixing and dilution of the effluent would be fair and subsequent flushing and dispersion, poor.

It is assumed that tertiary level treatment would be employed at both locations in order to meet water quality criteria.

This alternative explored the concept of regionalization with Bremerton. Although regionalization, when applied over reasonable distances, generally reduces total wastewater treatment costs, the need to add expensive tertiary level processes would increase total costs to study area residents over those of the preferred alternative. Additionally, wastewater discharge to enclosed inlets such as Dyes and Sinclair, is not desirable, even when treatment is provided for reduction of recognized pollutants.

Alternative Plan No. 7

Wastewaters from sub-basing 9 and 10, the Trident Support Site and Bremerton would be collected and treated at a renovated and expanded Charleston Sewage Treatment Plant. The treated effluent would be discharged to Sinclair Inlet through a submerged outfall in 35-foot deep water. Modeling results indicate that first mixing and dilution of the effluent would be fair and subsequent dispersion and flushing would be poor. Initial dilution could provide at least 100:1 dilution of the effluent an average of 73 percent of the time but because of the enclosed nature of the inlet, diluted effluent would be the receiving water for dilution of more effluent. This fact, plus the need to provide expensive tertiary level treatment in order to maintain water quality made this alternative undesirable.

Alternative Plan No. 8

Wastewaters from sub-basins 9 and 10, the Trident Support Site and the Bremerton planning area would be collected and treated at a new wastewater treatment facility located near Enetai. Treated effluent would be discharged to Port Orchard channel through a submarine outfall in 80 feet of water. The Enetai site is well screened but located in a desirable residential area and thus not aesthetically suited for a treatment facility.

Modeling results predict that first mixing and dilution of the effluent would be poor and subsequent dispersion and flushing would be fair. Field studies verified the frequent presence of weak currents which would provide at least 100:1 dilution an average 63 percent of the time. Nevertheless, water quality criteria should be met most of the time.

The capital costs of this alternative are higher than those for the preferred plan but annual operating and maintenance costs are lower. The total net annual cash requirement for this alternative, after Federal and State reimbursement, is slightly higher.

More important reasons for not selecting this alternative lie in the relatively inferior discharge site at Enetai and the presence of a Clear Creek Valley pipeline that this alternative requires. Because the treatment facility is southeast of the Trident Support Site, the Trident wastewater should be pumped in that direction and the alternative northern route found in alternative No. 11 would not be feasible. Also, the benefits of regionalization with Poulsbo would be lost in alternative No. 8.

Alternative Plan No. 9

Wastewaters from sub-basins 9 and 10, the Trident Support Site and the Bremerton planning area would be collected and treated at an expanded Manchester Sewage Treatment Plant. Treated effluent would be discharged to Puget Sound near Rich Passage.

The submarine outfall depth would be below 165 feet. Modeling results indicate that due to the depth and strong currents in the area, at least 100:1 dilution could be provided 100 percent of the time resulting in excellent first mixing and dilution and excellent subsequent dispersion and flushing. In terms of water quality, this alternative is highly desirable and equivalent to a discharge at Point Monroe.

This alternative has a slightly higher annual cost than the preferred alternative and includes the Clear Creek interceptor. There is no provision of capacity for Poulsbo, Keyport, or the Keyport Naval Torpedo Station. The Sinclair Inlet facilities planner and the City of Bremerton have indicated that their preliminary studies show this alternative as not being cost-effective for their participation.

Alternative No. 10

Wastewater from sub-basins 9 and 10 and the Trident Support Site would be collected and treated at a new secondary level wastewater treatment facility, the site presumably to be located at Brownsville. The treated effluent would be sprayed onto the land for disposal.

Preliminary analysis, presented in Chapter II, indicates that at high disposal rates the potential of polluting an extremely valuable resource, the groundwater, in both surface and lower aquifers is too great. At low disposal rates designed to protect groundwater, over

8,000 acres of land would be required. In both cases, the spray irrigation system costs would be very large. This alternative was eliminated from further consideration in the environmental impact statement due to its low feasibility.

Alternative Plan No. 11

This plan was developed in response to public pressures against an interceptor sewer along the Clear Creek drainage basin and in order to better accomodate wastewaters from the Poulsbo Facilities Planning Area. Wastewaters would be collected from drainage sub-basins 9 and 10, the Trident Support Site and the Poulsbo area, with provision for accepting Keyport's wastewaters. Secondary level treatment would be provided at the north Brownsville site, and treated effluent would be discharged into approximately 40 feet of water in north Port Orchard channel. The north Brownsville site is reasonably well screened by thick stands of trees and is aesthetically acceptable for a wastewater treatment plant site.

The Trident Support Site wastewaters would be pumped eastward along Luoto Road and State Highway 303 to Keyport and then south along State Highway 303 to the plant site. Disruption of vegetation and ecosystems by pipeline construction would be minimal because all pipeline routes are along roadway rights-of-way except for the Liberty Bay crossing.

Outfall site modeling results, supported by some current measurements, indicate that first mixing and dilution of the effluent would be fair and subsequent dispersion and flushing would be good. It appears that water quality criteria should be met consistently with a minimum of 100:1 initial dilution occuring 71 percent of the time and a minimum of 10:1 dilution occuring 95 to 99 percent of the time. With improved coliform removals, 10:1 dilution of secondary effluent will meet Class AA standards.

Alternative No. 11 is the preferred plan for a variety of reasons. As will be shown at the end of this chapter, Alternative No. 11 has the least cost of all the alternatives under consideration. This plan provides for a much needed reduction in public health risks with minimum negative environmental and social impacts. This plan provides for the protection of the Clear Creek rural area by moving the Trident Support Site sewer to another location and it would provide for the discharge of treated effluent into a safe and acceptable location.

POULSBO

The inclusion of the Poulsbo Facilities planning area in the original group of alternatives was done to make sure that no viable regional wastewater treatment system was overlooked. The preferred plan includes wastewaters originating in Poulsbo because of the belief that the single regional system is more efficient, less costly and subject to better operator control than two facilities. This belief is disputed by the City of Poulsbo, presumably on the basis of cost. Cost figures developed by the facilities planner for Poulsbo indicate lower treatment costs than presented in this document. Furthermore, the current plan for Poulsbo is to discharge treated effluent into Ne-Si-Ka Bay.

The costs presented in the next chapter show a definite benefit to Kitsap County for regionalized treatment with Poulsbo, and thus Poulsbo's participation is included as part of the preferred plan. Also, Ne-Si-Ka Bay was not studied in detail for this report, but it is believed that the marine water quality impacts of a discharge to that bay may be less desirable and have greater impact on Liberty Bay than the discharge of the preferred plan to the main body of North Port Orchard channel. Also there may be long term benefit in provision of an opportunity for Keyport and the Keyport Naval Torpedo Station to remove their discharges from Ne-Si-Ka Bay.

If Poulsbo were not to join the regional system, this EIS would not be invalidated. Marine water impact would be slightly decreased in degree and total regional costs would increase. The resulting alternative (as opposed to the preferred alternative No. 11) would be similar to alternative No. 5 without the Clear Creek interceptor route.

No-Project Alternative

The no-project alternative was subjected to a preliminary screening by the facilities planning consultant. Without the project, there would be substantial negative environmental impacts, namely: polluted groundwaters, unsafe drinking water supplies, increased pollution of local surface and marine waters, failing septic tank drainfields and no provisions for sewer service for an expanding population. These impacts were deemed unacceptable, and the no-project alternative was discarded.

PROJECT COSTS

Table I-2 presents the final estimates made by the facilities planner for total project costs of each alternative. This table clearly shows that the cost to Central Kitsap County and the combined costs for alternative No. 11 are the lowest of all. Alternative No. 5,

Table I-2. COMPARISON OF TOTAL PROJECT COSTS[a]

Alternative	Annual cost-rank order	Central Kitsap's cost, $ x 10^6			Poulsbo's cost, $ x 10^6			Combined cost, $ x 10^6		
		Capital	Annual O&M	Total annual[b]	Capital	Annual O&M	Total annual[b]	Capital	Annual O&M	Total annual[b]
1	6	16.98	0.85	2.32	3.13	0.20	0.47	20.11	1.05	2.79
2	9	15.75	0.81	2.17	5.96[c]	0.23	0.75	21.71	1.04	2.92
3	5	19.48	0.57	2.25	3.13	0.20	0.47	22.61	0.77	2.72
4	7	19.43	0.57	2.25	3.89[c]	0.21	0.55	23.32	1.12	2.80
5	2	15.68	0.54	1.89	3.13	0.20	0.47	18.81	0.74	2.36
6	8	17.87	0.86	2.40	3.13	0.20	0.47	21.00	1.06	2.87
7	10	22.11	0.75	2.66	3.13	0.20	0.47	25.24	0.95	3.13
8	3	18.99	0.41	2.05	3.13	0.20	0.47	22.12	0.61	2.52
9	4	19.43	0.41	2.09	3.13	0.20	0.47	22.56	0.61	2.56
11	1	14.22	0.48	1.71	3.80[c]	0.13	0.46	18.03	0.61	2.17

[a] In June 1975 dollars

[b] Capital costs amortized over 20 years at 5-7/8 percent

[c] Indicates Poulsbo's participation in regional facility

which is a plan similar to No. 11 but does not include Poulsbo's participation, is the next lowest cost alternative.

It is admitted that the capital cost to Poulsbo's residents increases for a regionalized facility; however, the operating and maintenance costs are very substantially decreased. Thus there is a calculated net annual saving to Poulsbo with their participation. Alternatives No. 2, 4 and 11 include participation of Poulsbo in a regional facility. Other alternatives include the cost of separate wastewater treatment and disposal facilities for Poulsbo.

Regionalization with Bremerton is calculated to cost substantially more, as evidenced by alternatives No. 6, 7, 8 and 9.

The EPA is required by law to look at total project costs of alternatives, prior to various reimbursements, i.e., to select an alternative on the basis of total costs, not local costs. For Central Kitsap County, alternative No. 11 provides the lowest total costs with acceptable environmental impacts.

NUMERICAL RATING

A numerical rating and evaluation system was used within this environmental impact statement as a tool to assist in the comparison of the relative merits of each alternative. The evaluation system is explained in Appendix A, where the computer output tabulating environmental impacts for all alternatives is also displayed. A sensitivity analysis within the computer program presents the expected change a final score may undergo due to a change in a single category score.

Table I-3 presents the new final weighted scores for each alternative, reflecting all changes resulting from Phase II studies, new design data and the new alternative plan No. 11. These scores should be used with discretion and only as an aid to the ranking of alternatives.

Figure I-3 presents a graphic display and comparison of positive and negative ratings of categories for the ten alternatives evaluated in detail.

Table I-3. COMPARISON OF PROJECT RATINGS FOR TEN ALTERNATIVES

Alternative	Project rating[a]	Relative rating[b]	Resulting ranking
1	6.82	53.6	8
2	6.82	53.6	8
3	12.24	96.2	4
4	12.33	96.9	3
5	11.41	89.6	5
6	6.82	53.6	8
7	9.24	72.6	6
8	8.53	67.0	7
9	12.58	98.8	2
11	12.73	100.0	1

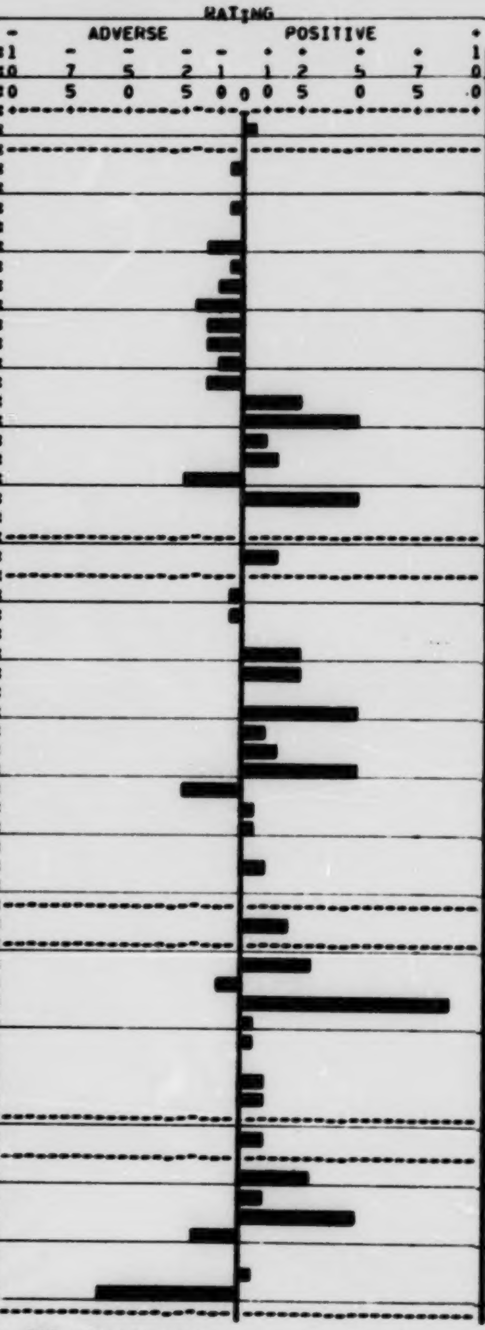
[a] Per E.I.R.S. computer output, based upon weightings derived from survey conducted by URS Company.

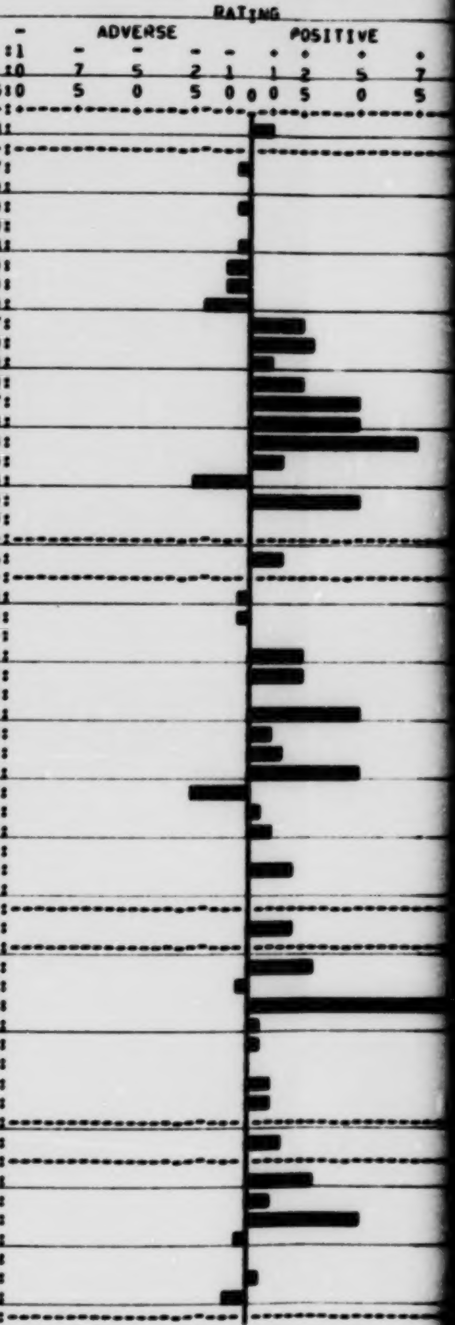
[b] Expressed as an index number (percentage); highest rated alternative set at 100 percent; other ratings calculated from that point.

SILVERDALE-DYES INLET
ALTERNATIVE 1, 2 and 6
OVERALL WEIGHTED RATING = 6.82

POINT MONROE
ALTERNATIVE 3
OVERALL WEIGHTED RATING = 12.24

IMPACT ITEM NAME	SILVERDALE-DYES INLET NUMERICAL RATING	POINT MONROE NUMERICAL RATING
PHYSICAL IMPACTS	2.66	9.73
ENVIRONMENTAL QUALITIES	-1.67	-1.67
AIR QUALITY	0.00	0.00
EXTERNAL NOISE	-5.00	-5.00
ODOR	0.00	0.00
TERRESTRIAL ENVIRONMENT	-12.08	-6.58
WILDLIFE & ITS HABITATS	-5.00	-10.00
FRESHWATER ECOLOGY	-10.00	-10.00
VEGETATIVE COMMUNITIES	-20.00	-20.00
MARINE BIOL. ENVIRONMENT	-13.33	21.67
BENTHIC	-15.00	30.00
WATER COLUMN	-10.00	10.00
SURFACE	-15.00	25.00
WATER QUALITY	23.50	45.17
SURFACE WATER	60.00	60.00
MARINE WATER	10.00	75.00
GROUNDWATER	12.50	12.50
GROUNDWATER QUANTITY	-25.00	-25.00
GROUNDWATER QUALITY	50.00	50.00
SOILS (FERTILITY)	0.00	0.00
RESOURCE IMPACTS	10.04	10.46
UTILITY SERVICE SYSTEMS	-0.50	-0.50
ELECTRICAL	-1.00	-1.00
WATER	0.00	0.00
MUNICIPAL SERVICES (I)	25.00	25.00
ENVIRONMENTAL HEALTH	25.00	25.00
PARKS AND RECREATION	0.00	0.00
SANITARY SEWER SYSTEM	50.00	50.00
NATURAL RESOURCES	5.63	6.88
POTABLE UNDERGRND WATER	12.50	12.50
QUALITY	50.00	50.00
QUANTITY	-25.00	-25.00
POTABLE SURFACE WATER	5.00	5.00
FAUNA	5.00	10.00
TERRESTRIAL	0.00	0.00
MARINE	10.00	20.00
FLORA - CROPS/COMMERCIAL	0.00	0.00
ECONOMIC IMPACTS	18.75	19.58
DIRECT EFFECTS	27.50	29.17
MUNICIPAL SERVICES COSTS	-10.00	-5.00
LOANS AND SUBSIDIES	90.00	90.00
PROPERTY TAX	2.50	2.50
CHANGES IN TAX REVENUES	5.00	5.00
CHANGES IN TAX RATES	0.00	0.00
INDIRECT EFFECTS	10.00	10.00
PROPERTY VALUES	10.00	10.00
SOCIO-CULTURAL IMPACTS	5.83	14.17
SOCIAL IMPACTS	30.00	30.00
PLANNED LAND USE PATTERN	10.00	10.00
HEALTH AND SAFETY	50.00	50.00
CULTURAL/ESTHETIC IMPACT	-18.33	-1.67
ARCHEOLOGICAL/HISTORICAL	0.00	0.00
ENTERTAINMENT/RECREATION	5.00	5.00
EXT ESTHETIC IMPRESSION	-60.00	-10.00





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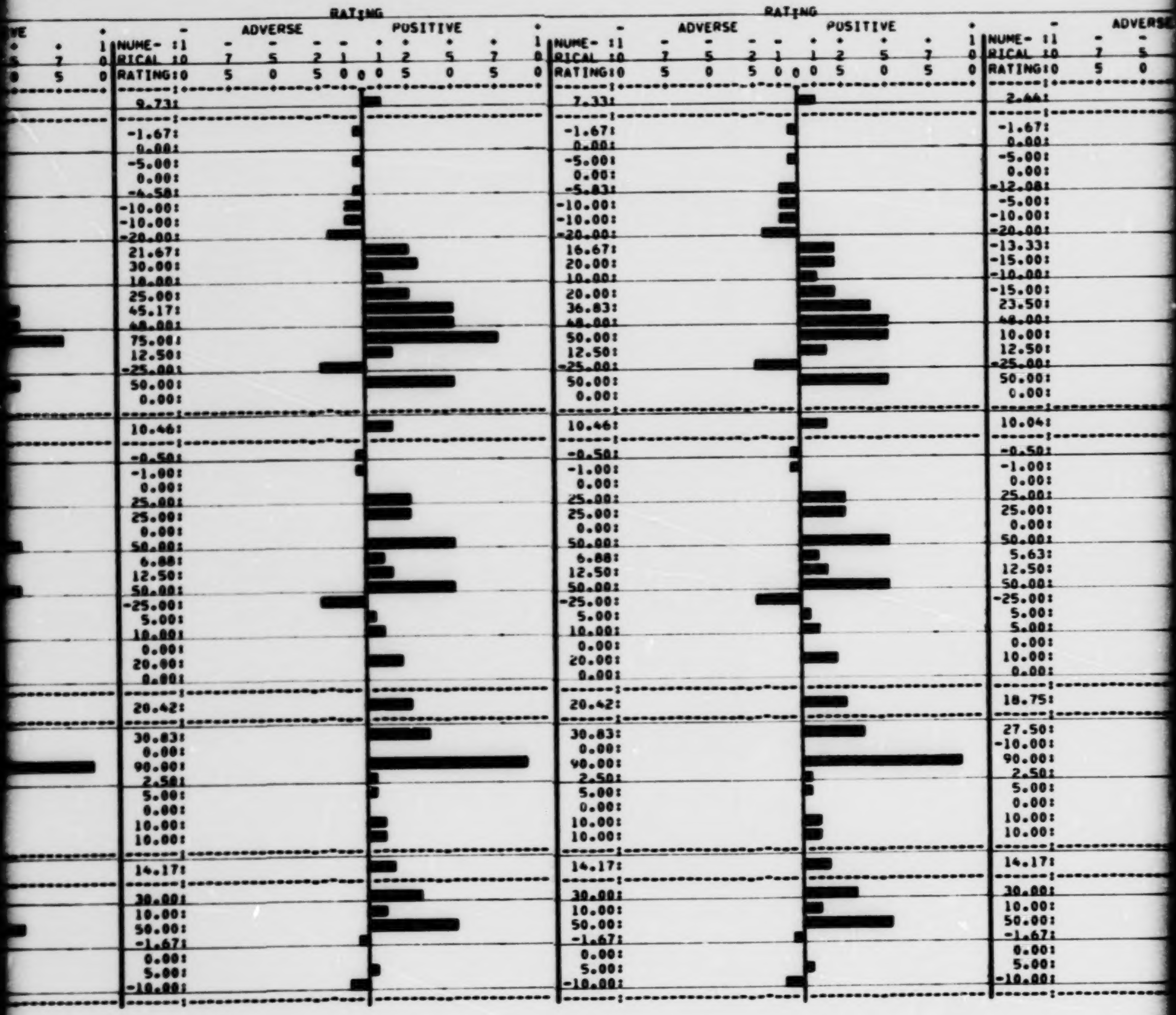
= 12.24

POINT MONROE
ALTERNATIVE 4
OVERALL WEIGHTED RATING = 12.33

PORT ORCHARD
ALTERNATIVE 5
OVERALL WEIGHTED RATING = 11.41

OVERALL

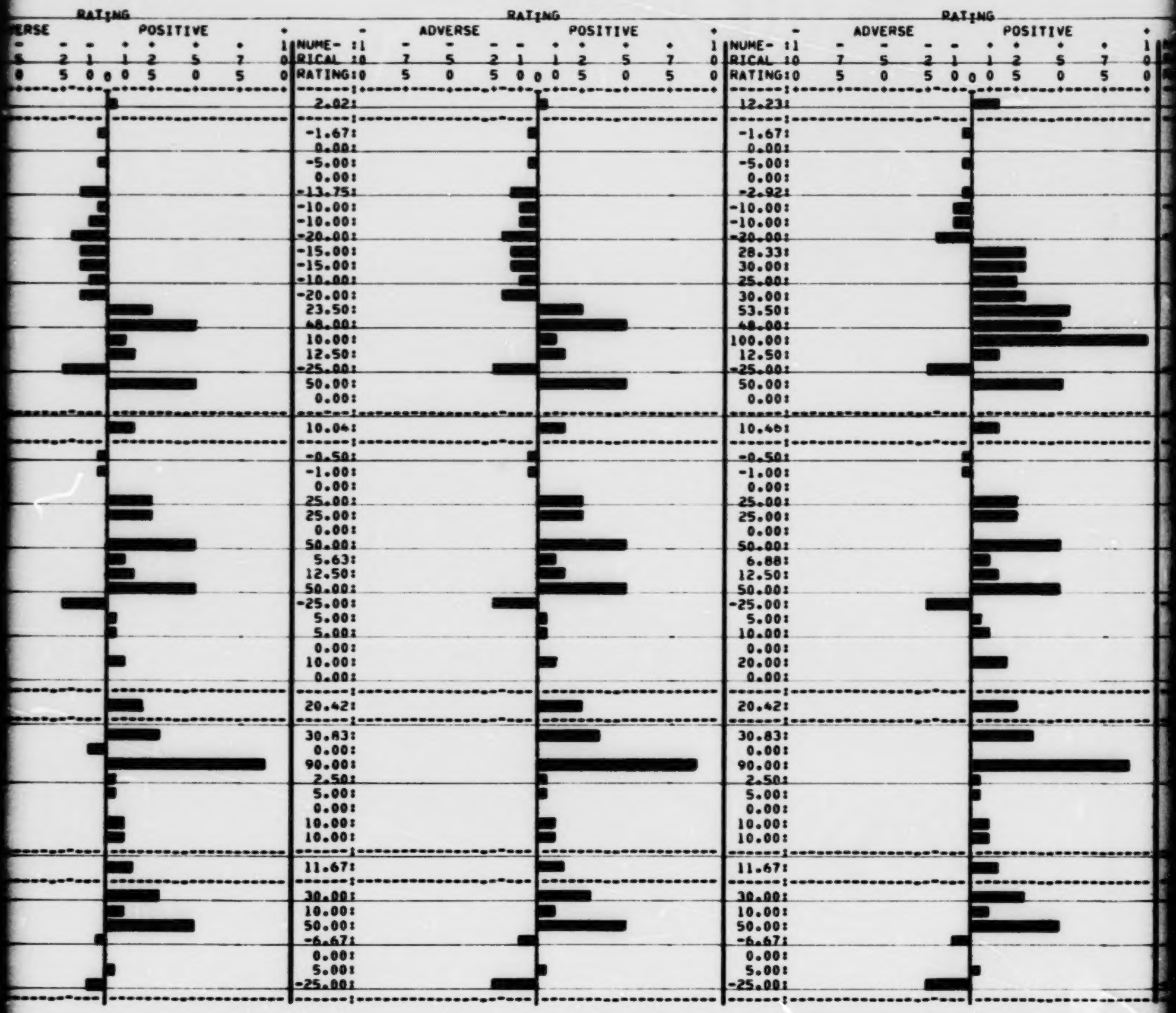


POINT MONROE ALTERNATIVE 4	PORT ORCHARD ALTERNATIVE 5	
9.73	7.33	2.44
-1.67	-1.67	-1.67
0.00	0.00	0.00
-5.00	-5.00	-5.00
0.00	0.00	0.00
-4.50	-5.83	-12.08
-10.00	-10.00	-5.00
-10.00	-10.00	-10.00
-20.00	-20.00	-20.00
21.67	16.67	-13.33
30.00	20.00	-15.00
10.00	10.00	-10.00
25.00	20.00	-15.00
45.17	36.83	23.50
48.00	48.00	48.00
75.00	50.00	10.00
12.50	12.50	12.50
-25.00	-25.00	-25.00
50.00	50.00	50.00
0.00	0.00	0.00
10.46	10.46	10.04
-0.50	-0.50	-0.50
-1.00	-1.00	-1.00
0.00	0.00	0.00
25.00	25.00	25.00
25.00	25.00	25.00
0.00	0.00	0.00
50.00	50.00	50.00
6.88	6.88	5.63
12.50	12.50	12.50
50.00	50.00	50.00
-25.00	-25.00	-25.00
5.00	5.00	5.00
10.00	10.00	5.00
0.00	0.00	0.00
20.00	20.00	10.00
0.00	0.00	0.00
20.42	20.42	18.75
30.83	30.83	27.50
0.00	0.00	-10.00
90.00	90.00	90.00
2.50	2.50	2.50
5.00	5.00	5.00
0.00	0.00	0.00
10.00	10.00	10.00
10.00	10.00	10.00
14.17	14.17	14.17
30.00	30.00	30.00
10.00	10.00	10.00
50.00	50.00	50.00
-1.67	-1.67	-1.67
0.00	0.00	0.00
5.00	5.00	5.00
-10.00	-10.00	-10.00

SINCLAIR INLET
ALTERNATIVE 7
RALL WEIGHTED RATING = 9.24

ENETAI
ALTERNATIVE 8
OVERALL WEIGHTED RATING = 8.53

MANCHESTER
ALTERNATIVE 9
OVERALL WEIGHTED RATING 12.58



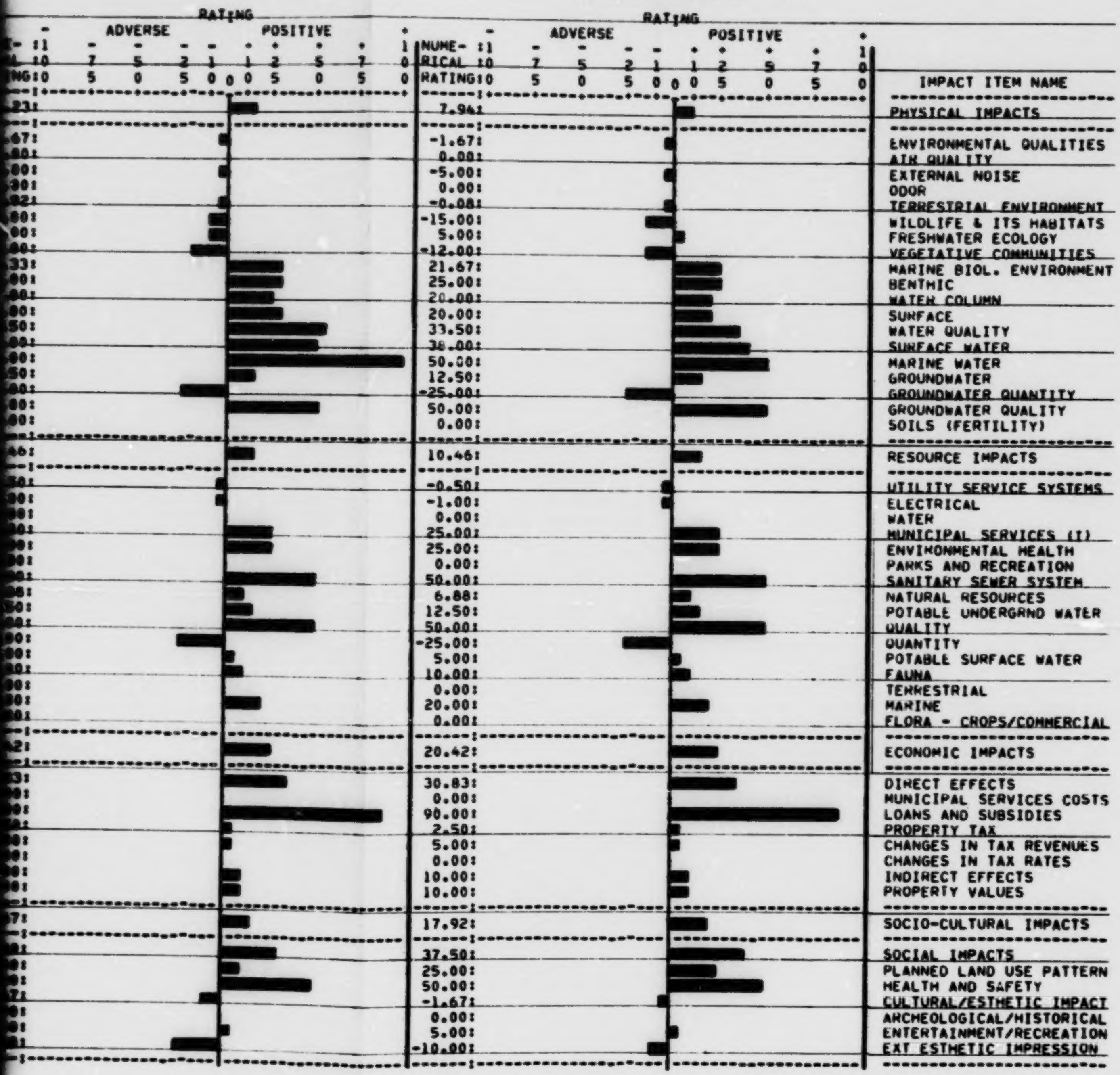
ENETAI NUME-RICAL RATING	MANCHESTER NUME-RICAL RATING
2.02	12.23
-1.67	-1.67
0.00	0.00
-5.00	-5.00
0.00	0.00
-13.75	-2.92
-10.00	-10.00
-10.00	-10.00
-20.00	-20.00
-15.00	28.33
-15.00	30.00
-10.00	25.00
-20.00	30.00
23.50	53.50
48.00	48.00
10.00	100.00
12.50	12.50
-25.00	-25.00
50.00	50.00
0.00	0.00
10.04	10.46
-0.50	-0.50
-1.00	-1.00
0.00	0.00
25.00	25.00
25.00	25.00
0.00	0.00
50.00	50.00
5.63	6.88
12.50	12.50
50.00	50.00
-25.00	-25.00
5.00	5.00
5.00	10.00
0.00	0.00
10.00	20.00
0.00	0.00
20.42	20.42
30.83	30.83
0.00	0.00
90.00	90.00
2.50	2.50
5.00	5.00
0.00	0.00
10.00	10.00
10.00	10.00
11.67	11.67
30.00	30.00
10.00	10.00
50.00	50.00
-6.67	-6.67
0.00	0.00
5.00	5.00
-25.00	-25.00

E.I.R.S.
ENVIRONMENTAL IMPACT REVIEW SERVICE
FOR: KITSAP WASTEWATER TREATMENT

DATE: 04/01/76

MANCHESTER
ALTERNATIVE 9
OVERALL WEIGHTED RATING 12.58

PORT ORCHARD
ALTERNATIVE 11
OVERALL WEIGHTED RATING = 12.73



NUMERICAL RATING	IMPACT ITEM NAME
7.94	PHYSICAL IMPACTS
-1.67	ENVIRONMENTAL QUALITIES
0.00	AIR QUALITY
-5.00	EXTERNAL NOISE
0.00	ODOR
-0.08	TERRESTRIAL ENVIRONMENT
-15.00	WILDLIFE & ITS HABITATS
5.00	FRESHWATER ECOLOGY
-12.00	VEGETATIVE COMMUNITIES
21.67	MARINE BIOL. ENVIRONMENT
25.00	BENTHIC
20.00	WATER COLUMN
20.00	SURFACE
33.50	WATER QUALITY
38.00	SURFACE WATER
50.00	MARINE WATER
12.50	GROUNDWATER
-25.00	GROUNDWATER QUANTITY
50.00	GROUNDWATER QUALITY
0.00	SOILS (FERTILITY)
10.46	RESOURCE IMPACTS
-0.50	UTILITY SERVICE SYSTEMS
-1.00	ELECTRICAL
0.00	WATER
25.00	MUNICIPAL SERVICES (I)
25.00	ENVIRONMENTAL HEALTH
0.00	PARKS AND RECREATION
50.00	SANITARY SEWER SYSTEM
6.88	NATURAL RESOURCES
12.50	POTABLE UNDERGRND WATER
50.00	QUALITY
-25.00	QUANTITY
5.00	POTABLE SURFACE WATER
10.00	FAUNA
0.00	TERRESTRIAL
20.00	MARINE
0.00	FLORA - CROPS/COMMERCIAL
20.42	ECONOMIC IMPACTS
30.83	DIRECT EFFECTS
0.00	MUNICIPAL SERVICES COSTS
90.00	LOANS AND SUBSIDIES
2.50	PROPERTY TAX
5.00	CHANGES IN TAX REVENUES
0.00	CHANGES IN TAX RATES
10.00	INDIRECT EFFECTS
10.00	PROPERTY VALUES
17.92	SOCIO-CULTURAL IMPACTS
37.50	SOCIAL IMPACTS
25.00	PLANNED LAND USE PATTERN
50.00	HEALTH AND SAFETY
-1.67	CULTURAL/ESTHETIC IMPACT
0.00	ARCHEOLOGICAL/HISTORICAL
5.00	ENTERTAINMENT/RECREATION
-10.00	EXT ESTHETIC IMPRESSION

Figure I-3. Summary Comparisons of Alternatives

II ENVIRONMENTAL SETTING

CHAPTER II

ENVIRONMENTAL SETTING

PHYSIOGRAPHY

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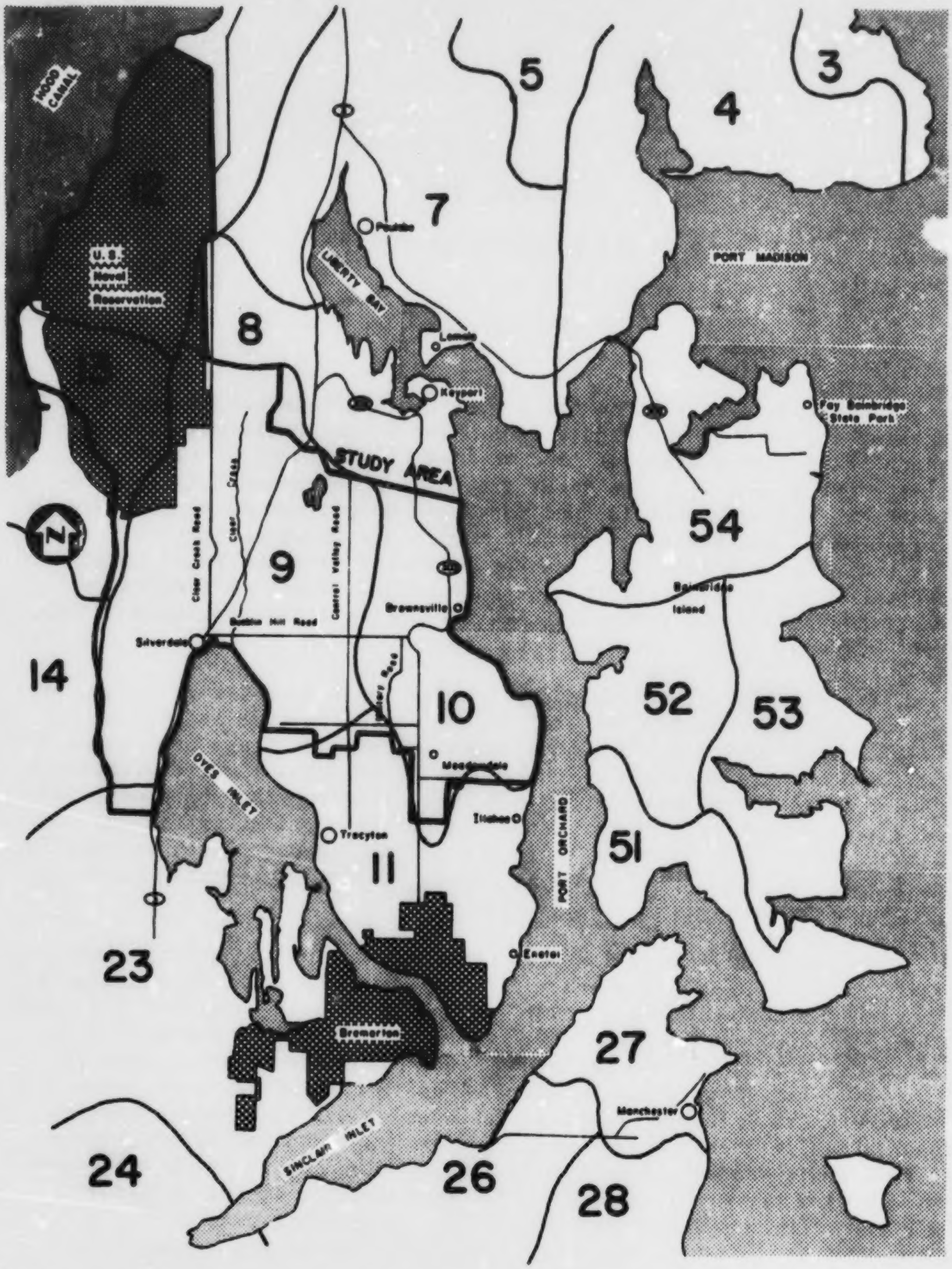
The study area lies on the Kitsap Peninsula in central western Washington, as shown on Figure II-1. The Kitsap Peninsula areas include 581.8 square miles of land bounded by waterways of the Puget Trough (Reference 1). The Puget Trough is a north-south lowland between the Cascade Mountains and the Coast Range, extending from Oregon into Canada, the marine portions of which are known collectively as Puget Sound. The Hood Canal on the north and west and Puget Sound proper on the east border the Kitsap Peninsula area. Extensions of Puget Sound into the peninsula area include Port Madison, Liberty Bay, Port Orchard channel and Dyes and Sinclair Inlets.

The study area, on the Kitsap Peninsula, lies entirely within Kitsap County, between 122°30' and 122°45' west longitude and 47°36' and 47°47' north latitude. The study area contains drainage sub-basins 9 and 10 and those portions of sub-basins 12 and 13 which lie within the Bangor Annex to the Keyport Naval Torpedo Station. Environmental impact assessments will not be conducted on the portions within the Bangor Annex (also referred to as the Trident Support Site) as that facility is the subject of an environmental impact statement already completed (Reference 3).

Drainage sub-basins 9 and 10 generally follow topographic features separating drainage areas tributary to Dyes Inlet (sub-basin 9) and central Port Orchard channel (sub-basin 10). Figure II-1 presents the generalized sub-basin boundaries as defined by the Basin Plan (Reference 4). These boundaries are somewhat flexible in areas between clearly defined streams; therefore, a definition of the study area that reflects possible growth patterns and possible sewerage service boundaries in these vaguely defined areas was prepared by the facilities planning consultant. The facilities planning study area boundaries define the study area for this environmental impact assessment and are also shown on Figure II-1. The approximate size of the planning area is 33 square miles, of which 10.8 square miles are within the Trident Support Site.

The topography within the study area is undulating terrain with



HOOD CANAL
5
3
4
7
Poulsbo
LIBERTY BAY
PORT MADISON
U.S. Naval Reservation
8
Lemolo
Keyport
Fay Bainbridge State Park
STUDY AREA
N
Clear Creek Road
Clear Creek
Central Valley Road
9
54
Brownsville
Bainbridge Island
Bucklin Hill Road
Silverdale
14
52
53
10
Meadowdale
DYES INLET
Illahee
PORT ORCHARD
Tracyton
11
51
23
Enetai
Bremerton
27
Manchester
SINCLAIR INLET
24
26
28

Source: References 1 and 4.

Figure II-1. Location of study area and drainage sub-basins

elevations between sea level and 400 ft. Steep bluffs and ravines exist along the eastern and western boundaries, but the majority of the shoreline is gently sloping beach. Low north-south ridge areas separate Central Valley from Clear Creek Valley, and sub-basin 9 from sub-basin 10.

GEOLOGY

Geomorphology

Information on the geology of the study area is obtained primarily from Water Supply Bulletin No. 18 (Reference 5).

The oldest rocks in the study area are of the Tertiary Age. Basaltic and andesitic lavas were laid down in great thicknesses during the early and middle Eocene Epoch throughout western and southwestern Washington. Volcanic activity subsided toward the end of the Eocene Epoch, and during the Oligocene and early Miocene Epochs marine sediments accumulated in thicknesses of thousands of feet over the volcanic rocks. These formations were greatly deformed in the late Miocene, giving rise to the ancestral Cascade Mountains. These mountains were largely eroded during the early to middle Pliocene. Puget Trough was formed in the late Pliocene as a result of a north-south uplift which produced the present Cascade and Olympic Mountains.

After the Tertiary Period, the present Puget Sound lowlands received great deposits of sediments consisting of silts and clays interspersed with layers of coarse sands and gravels. The coarse materials were deposited by streams and glaciers, whereas finer sediments settled down in lakes. Several large ice sheets covered the Puget Sound lowland during the Pleistocene (Ice Age) Epoch. These glaciers originated in Canada and were 2,000 to 5,000 feet thick in several instances.

Climatic fluctuations resulted in several advances and retreats of the ice mass during the Pleistocene time. The last ice disappeared about 14,000 years ago. Sands and gravels deposited by these ice masses were carried by streams emanating from the front of each glacier. Between ice periods, lush forests similar to those presently growing in the study area appeared and were successively buried under ice and stream deposits. Their decomposition over thousands of years has yielded peat beds mixed within clay and silt materials.

During the advance of each new ice sheet, a primary deposit of till or hardpan was spread onto the preexisting topography. The precise number of glacial advances and retreats is not known because of partial obliteration of the effects of earlier glaciers by succeeding ice flows. At least four glaciations have been documented in recent stratigraphic investigations of the area.

In Recent time, the streams which emptied into Puget Sound have formed deltas at their mouths. Erosion of the uplands and deposition of silts and sands in the lowlands have continued to the present time.

Geohydrology

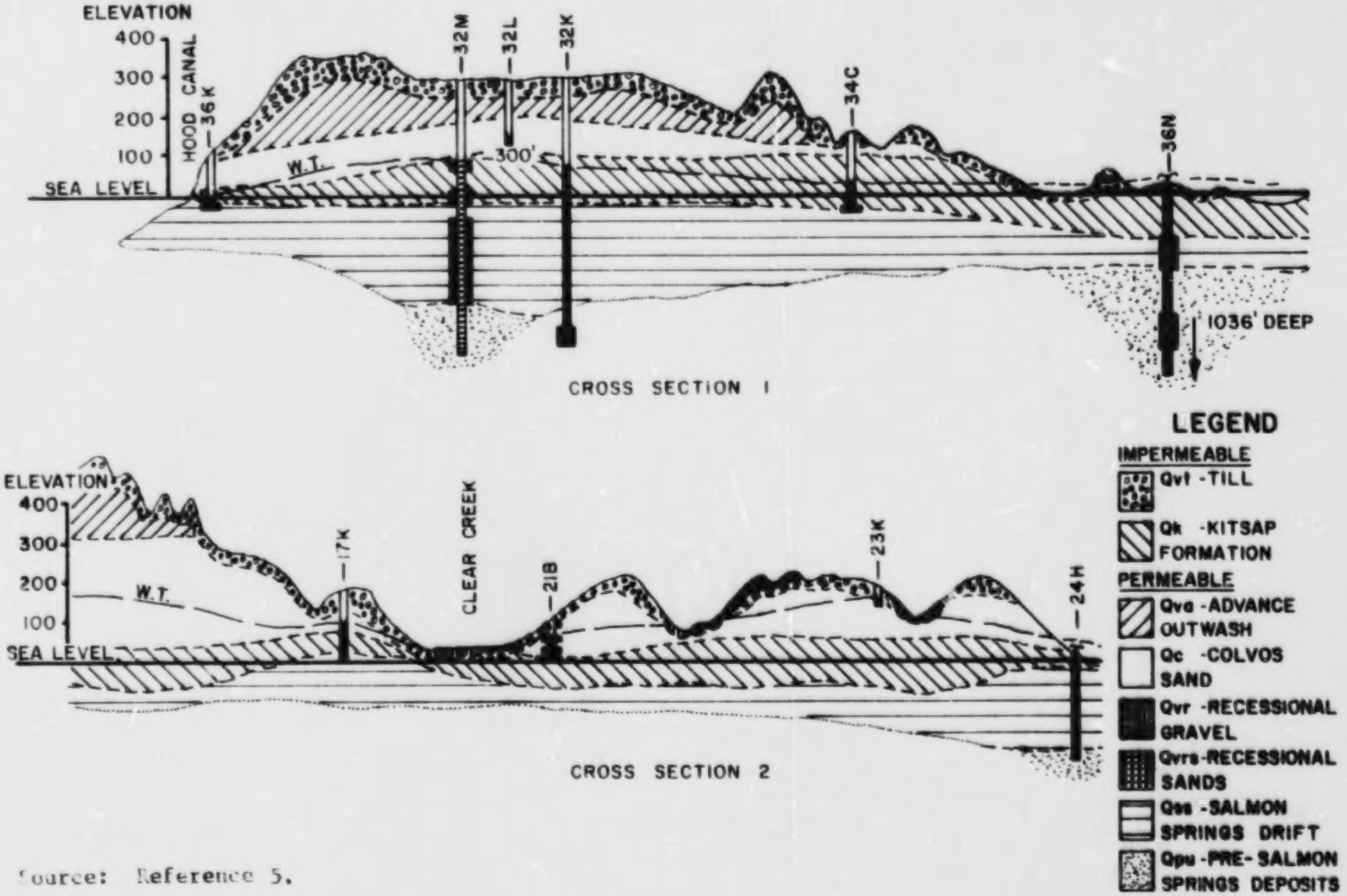
The succession of glaciation and formation of mountains in the Puget Sound area has resulted in a layering of base material under the study area. Often this base material is fractured and discontinuous so that aquifer layers do not necessarily readily intermix. Figure II-2 shows the cross-sections of the geological stratification underneath the northern and southern parts of the study area (Reference 5). The lines along which the cross-sections are represented are shown on Figure II-3.

As can be seen from Figure II-2, there are basically two aquifer layers and one surface water table in the study area. The study area is capped by a layer of relatively impermeable till of 20 to 50 feet in thickness which does not permit surface water to pass easily into the underlying aquifer. Below this till is a shallow aquifer in Colvos Sand and Advance Outwash base materials. The aquifer is often above a useful water table, and most drilled wells must penetrate to the Salmon Springs formation. This aquifer is underlain by the impermeable Kitsap Formation, below which are the Salmon Springs and Pre-Salmon Springs formations. The latter contain abundant fresh water.

Within the study area, surface waters can generally reach the first aquifer level (Colvos Sand) at points where this formation has been exposed through erosion, namely, in creek valleys and in lowlands between hills. There is essentially no connection between surface waters in the study area and the Salmon Springs formations.

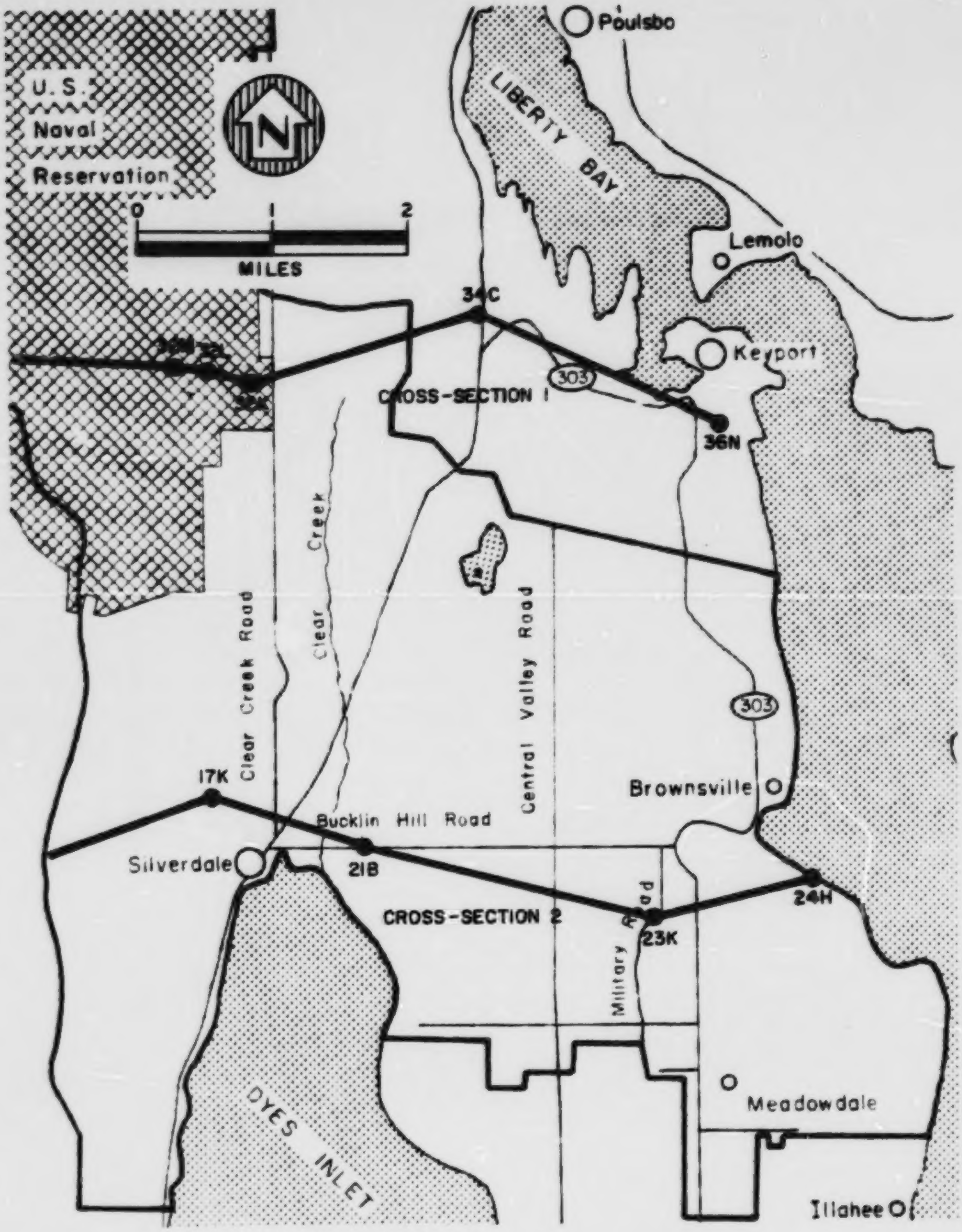
SOILS

Soils within the study area are underlain either by strongly hardened or by slightly compacted or noncompacted subsoils. Soils underlain by cemented hardpan include those of the Alderwood and Edmonds series. Permeable subsoils and substrate may be found with Everett, Indianola and Kitsap series soils and with undifferentiated alluvial soils. A detailed presentation of soil types found in the study area is presented in Appendix B.


ELEVATION
400
300
200
100
SEA LEVEL
HOOD CANAL
36K
32M
32L
32K
34C
36N
W.T.
300'
1036' DEEP
CROSS SECTION 1
ELEVATION
400
300
200
100
SEA LEVEL
W.T.
17K
CLEAR CREEK
21B
23K
24H
CROSS SECTION 2
LEGEND
IMPERMEABLE
Qvt -TILL
Qk -KITSAP FORMATION
PERMEABLE
Qva -ADVANCE OUTWASH
Qc -COLVOS SAND
Qvr -RECESSIONAL GRAVEL
Qvrs-RECESSIONAL SANDS
Qss -SALMON SPRINGS DRIFT
Qpu -PRE-SALMON SPRINGS DEPOSITS

Source: Reference 5.

Figure II-2. Geological cross-sections


Poulsbo
U.S. Naval Reservation
N
0
1
2
MILES
LIBERTY BAY
Lemolo
Keyport
34C
36N
32K
CROSS-SECTION 1
303
Clear Creek Road
Clear Creek
Central Valley Road
303
Brownsville
17K
Bucklin Hill Road
Silverdale
21B
CROSS-SECTION 2
Military Road
23K
24H
Meadowdale
DYES INLET
Illahee

Source: Reference 5.

Figure II-3. Location of geological cross-sections

Suitability for Septic Tank Filter Fields

The soils in the study area which are generally suitable as septic tank filter fields include (1) Everett gravelly sandy loam (Ev), (2) Everett gravelly loamy sand (Eg) and (3) Indianola loamy sand (Is). These soils are suitable due to the underlying subsoils, which provide good pollutant filtration, with reasonable hydraulic permeability. They cover less than five percent of the area and are mostly in the southern and western parts. Most of the other soils in the study area are severely limited for use in this method of wastewater disposal. In most instances the existence of a hardpan and/or high impermeability imposes a severe limitation rating on leach fields. Suitability of soil for septic tank leach fields is shown graphically on Figure II-4.

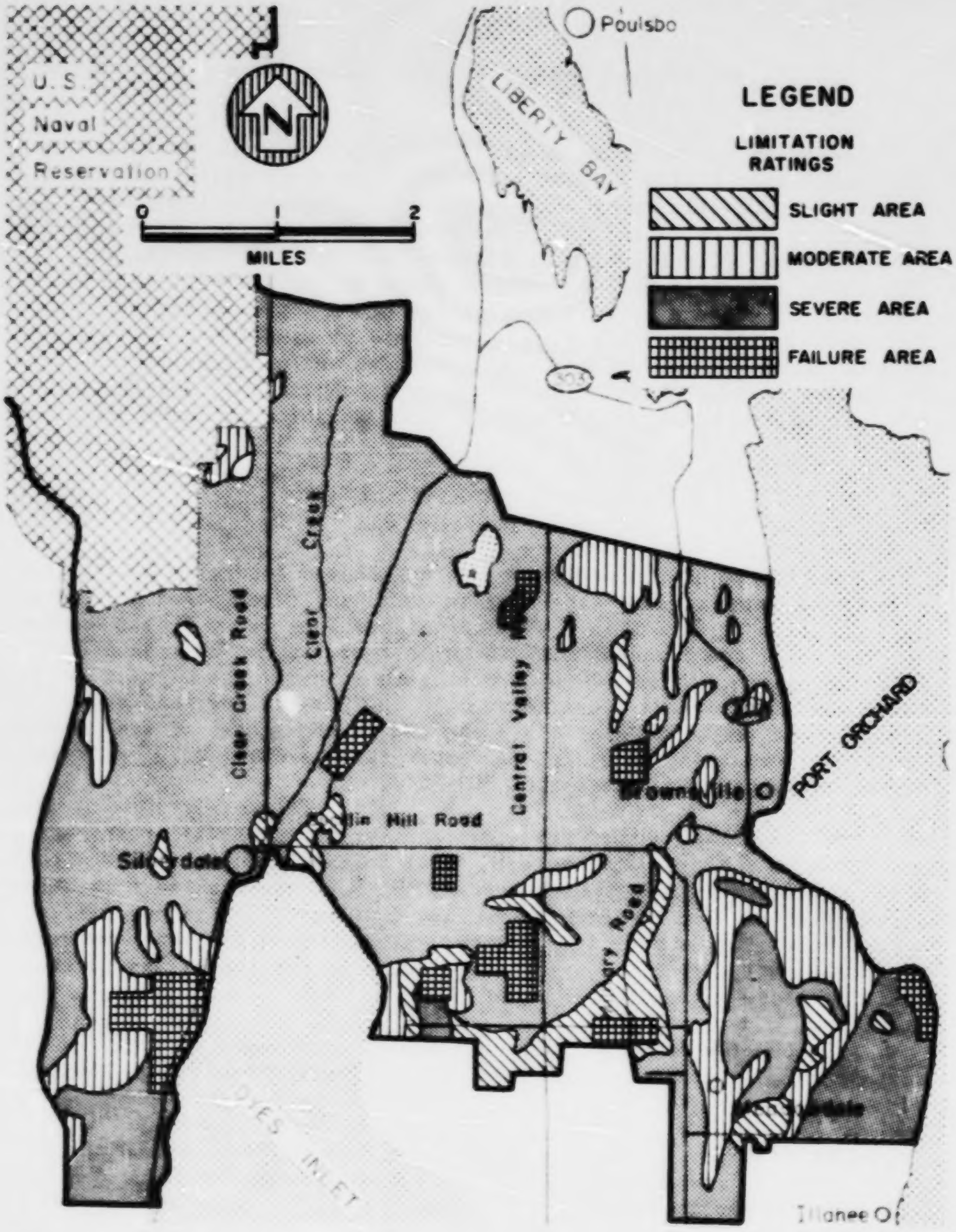
CLIMATOLOGY

The climate of the study area is one shared generally by the entire Puget Sound region. The Pacific Ocean and Puget Sound produce a mild maritime climate with a substantial and long rainy season extending over mild and pleasant winters, with temperatures averaging 40°-50°F during the day and 30°-40°F during the night. The Olympic Mountains west of the study area serve to block passage over the study area of most storms which occur along the western coast of Washington. Cool, dry summers produce daytime temperatures averaging 70°-80°F and nighttime temperatures averaging 50°-60°F.

The range and monthly mean temperatures during 1974 for Bremerton are shown in Table II-1 along with total monthly precipitation. There was no snowfall in 1974, but the Bremerton area experienced a relatively wet winter. Total precipitation for 1974 was 57.28 inches, 13.14 inches above the norm of 44.14 inches. The study area, which is within 5 to 15 miles from Bremerton, is of similar topography and is expected to have a similar climate.

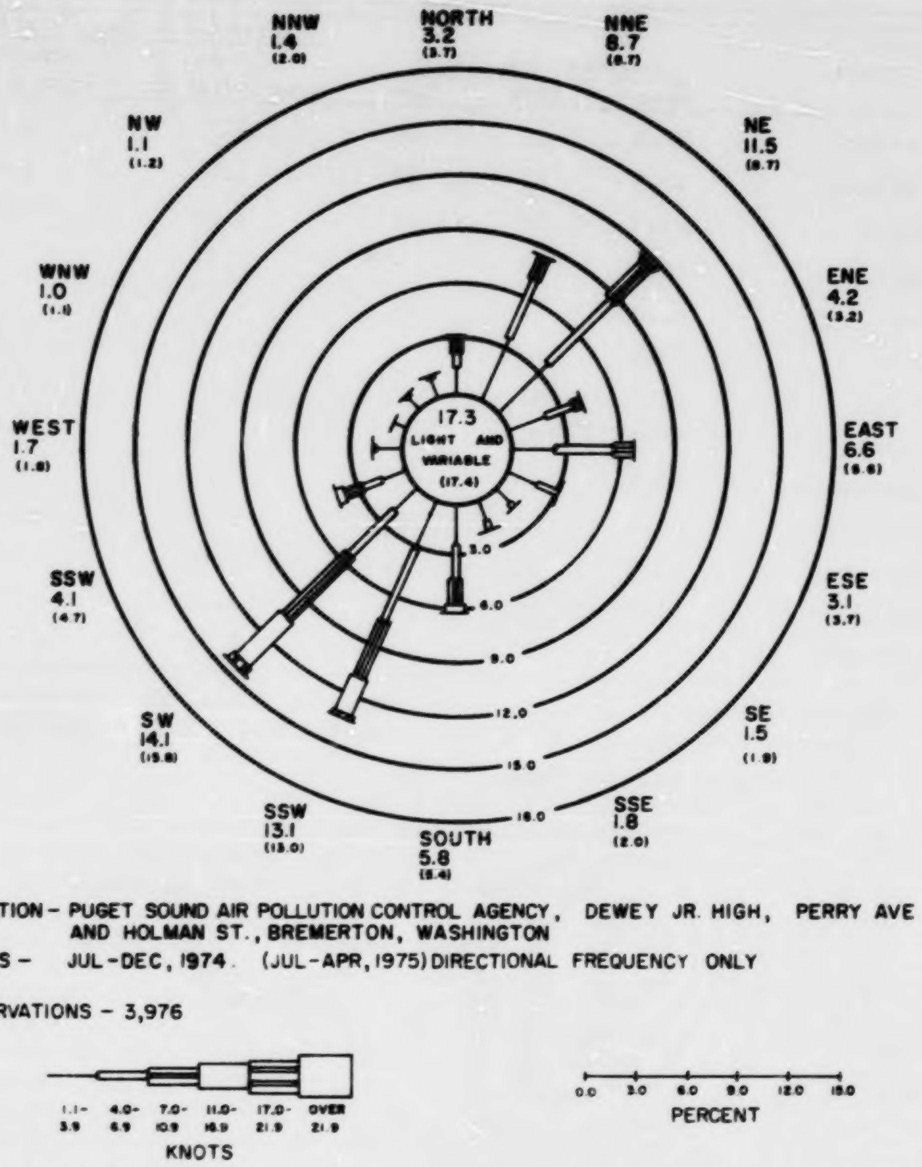
A discussion of wind conditions in the study area is aptly summarized in the Facilities Plan (Reference 1), from which the following is taken:

> *Wind sampling in the vicinity of the Planning Area was begun in July, 1974, by the Puget Sound Air Pollution Control Agency. The location of the sampling site is ... at Dewey Junior High School on Perry Avenue and Holman Street in Bremerton* [approximately five miles from the study area]. *The wind rose (a graphical representation of wind speed and direction frequencies of occurrence over time) for the period July 1974 through December, 1975 is presented in* [Figure II-5]. *The spokes indicate the relative frequency of winds of different speeds*


U.S. Naval Reservation
0
1
2
MILES
Poulsbo
LIBERTY BAY
LEGEND
LIMITATION RATINGS
SLIGHT AREA
MODERATE AREA
SEVERE AREA
FAILURE AREA
Clear Creek Road
Clear Creek
Central Valley
Brownsville
PORT ORCHARD
Silverdale
lin Hill Road
Road
DYES INLET
Illahee

Source: Reference 61

Figure II-4. Soil limitations for septic tank drain fields



LOCATION - PUGET SOUND AIR POLLUTION CONTROL AGENCY, DEWEY JR. HIGH, PERRY AVE
AND HOLMAN ST., BREMERTON, WASHINGTON

DATES - JUL-DEC, 1974. (JUL-APR, 1975) DIRECTIONAL FREQUENCY ONLY

OBSERVATIONS - 3,976

Source: Reference 1.

Figure II-5. Percentage frequency of occurrence of hour average surface winds

Table II-1. RECORDED TEMPERATURE AND RAINFALL FOR BREMERTON

Month	Temperature, °F			Precipitation, inches	
	Mean	High	Low	Total precipitation	Departure from normal
January	37.0	55	20	12.31	4.78
February	41.3	51	29	7.03	1.81
March	43.7	58	27	7.98	3.55
April	48.6	75	–[a]	3.44	.91
May	52.8	72	37	1.77	.18
June	59.8	–	–	1.33	–.08
July	62.7	88	42	3.11	2.55
August	65.2	91	50	.06	–.08
September	63.9	89	44	.35	–1.35
October	53.4	75	38	1.32	–2.78
November	46.2	58	35	8.60	1.69
December	41.5	54	27	9.98	2.67
ANNUAL	51.4	91	20	57.28	13.14

Reference: Climatological data, "Washington, Annual Summary 1974," U.S. Department of Commerce, N.O.A.A., Vol 78, No. 13.

[a] Dash indicates missing data.

and indicate the direction from which the wind blows. The numbers below the directional signs on the perimeter of the case indicate the percentage frequency winds blow from the direction (disregarding speed); the first number is for 6 months of data and the second number (in parentheses) relates to 10 months of data. For example, winds blowing from the East (E) accounted for 6.6% of the six month total and 5.6% of the 10 month total. The data from May and June is expected to show primarily a northeast orientation. Light and variable winds are those less than 1.5 knots and are shown in the center of the case. Although wind direction and speed is influenced by local land forms and land use, the Bremerton wind case generally depicts the predominant wind pattern expected in the central portion of the Planning Area.

AIR QUALITY

Air quality in Kitsap County was evaluated by Northwest Environmental Technology Laboratories, Inc. Results were presented in the Draft Facilities Plan. These results are restated in Appendix C and are summarized below.

The air quality in Kitsap County is very good. A monitoring program in Bremerton, a location assumed to be a "worst" case because of its greater population, has shown that carbon monoxide levels are far below one-hour and eight-hour standards. It is assumed that typical "smog" constituents such as hydrocarbons, photochemical oxidants and nitrogen dioxide would also be present at very low levels. This is due to the generally low county population, particularly within the study area, and to the frequent presence of winds from nonpolluted areas, exchanging air within the study area.

Existing Conditions from Available Inventory Data

Pollutant emission rates appropriate for the study area have been estimated and are summarized in Table II-2 for existing (1975) conditions. Countywide estimates were provided by the Puget Sound Air Pollution Control Agency which summarized the 1972 air contaminant emissions broken down for Kitsap County and for the following categories: fuel combustion, industrial sources, solid waste disposal, transportation sources and miscellaneous area sources such as orchard heating, agricultural burning and slash burning. These data were updated to 1975 assuming that only transportation and residential area sources of fuel were population dependent. Current solid waste disposal and slash burning are also updated in accordance with population estimates.

Table II-2. AIR POLLUTANT EMISSIONS IN KITSAP COUNTY (1975)

Carbon monoxide		Hydrocarbons		Nitrogen oxides		Sulfur dioxide		Particulates	
A[a]	B[b]	A	B	A	B	A	B	A	B
58.19	1.10	13.76	0.27	6.34	0.12	4.27	0.08	2.12	0.04

[a] Tons per day.

[b] Pounds per person per day.

NOISE

A sampling and analysis of the existing noise levels in the study area were conducted by the U.S. Navy in conjunction with their Trident Support Site Environmental Impact Statement (Reference 3). Table II-3

Table II-3. SITE CHARACTERISTICS AND NOISE ANALYSIS

Site No.	Location and characteristics	Conclusion
3A	Silverdale: driveway of Central Kitsap High School. This is a quiet residential neighborhood.	Expected to remain quiet with only minimal increases in background ambient noise if the Support Site is built.
3B	Silverdale: parking lot of Central Kitsap Elementary School. This site is close to an intersection on Route 3 and current noise levels already exceed the standard.	1980 noise levels will exceed both th L_{10} and L_{50} standards with or without Trident. The doubling of traffic along Route 3 associated with the Trident project will yield a 6 dBA increase over existing ambient noise levels.
3C	Silverdale: parking lot of Halfway House Antiques on Route 3. Current noise levels are above acceptable standards.	1980 noise levels will exceed acceptable standards with or without Trident. In either case the increase in median noise levels will be nominal.
4 and 5	Clear Creek Road: near the intersection of Luoto Road and north of the Sherman Hill Road intersection, respectively. Sites 4 and 5 show fairly high noise levels because the calculations were made only 18 or 19 feet off the road. Since this is not where the housing is located, the noise levels do not provide an accurate indication of the acoustic quality of the environment.	The relative increase in the median noise levels of these is of greater interest than are the absolute noise levels. Site 4 will show a small increase in noise levels by 1980 in any case. With Trident a somewhat higher but still acceptable increase. At site 5 a somewhat higher but still acceptable increase wiether or not Trident is built. Nighttime noise levels will be unacceptable at both sites with or without Trident.
6	Pearson: at the junction of Routes 308 and 3. The high noise level at this site is caused by traffic on the two adjacent highways.	Since the immediate vicinity of this site is not particularly sensitive to noise, the expected increase in the ambient noise level of 5 dBA without Trident and 7 dBA with Trident is for reference only.
7	Pearson: in front of the Hilder Pearson Elementary School on Route 308. Although noise levels at this site are affected by traffic on Routes 308 and 3 and Central Valley Road, the existing acoustic quality is good.	Acceptable noise levels will remain with or without Trident. Overall increases in the ambient noise level will be high since existing levels are low. The increase will be 9 dBA by 1980 with Trident and 6 dBA without Trident.
11	Intersection of Bucklin Hill Road and Richardson Road: near Silverdale. Bucklin Hill Road is a major east-west artery linking Route 3 with the Brownsville-Tracyton area of Kitsap County. Considerable residential development has recently taken place along this road. Noise levels at the intersection are currently unacceptable (L_{10} = 72 dBA; L_{50} = 55 dBA).	Noise levels are expected to become even higher, and both $L_{10}$and L_{50} levels will exceed the standard by 7 dBA without Trident or 13 dBA with Trident. The predicted median noise level will be 13 dBA over the existing value with Trident and 7 dBA over without. The higher noise levels with Trident will be a function of the tripling of traffic on Bucklin Hill Road over the no-build volume. Nighttime noise peaks will be extremely high (about 80 dBA) with or without trident.

summarizes the characteristics of the measurement stations in the study area, and Figure II-6 locates those stations.

Measurements of ambient conditions were made in the summer of 1973. These measurements are summarized in Table II-4. The criteria by which these noise levels were evaluated are found in Table II-5.

Table II-4. EDITED RESULTS OF NOISE PROGRAM OUTPUT

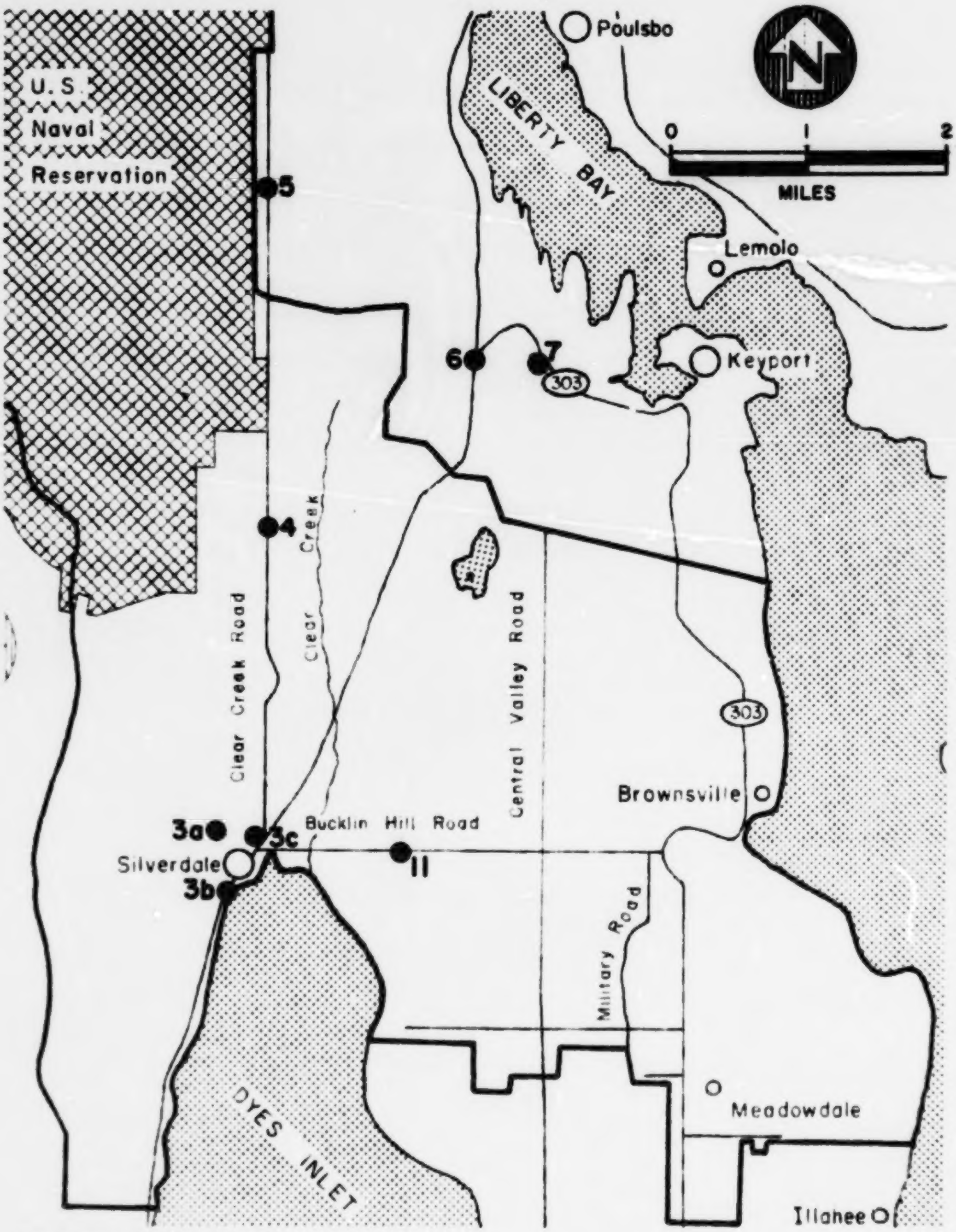
Site	Existing noise level (1973), dBA		1980 predicted noise levels, dBA					
			without Trident			with Trident		
	Peak hour[a]	Night peak	Peak hour[a]	L_{50}	Night peak	Peak hour[a]	L_{50}	Night peak
3A	58/46	-	55/43	-3	-	57/46	0	-
3B	58/61	-	70/59	-2	-	78/67	6	-
3C	69/61	-	70/59	-2	-	74/63	2	-
4	73/56	71	72/60	4	72	75/63	7	74
5	70/50	59	73/61	11	69	75/63	13	71
6	77/66	-	81/71	5	-	83/73	7	-
7	59/48	-	66/56	8	-	68/57	9	-
11	72/55	80	76/61	6	80	83/68	13	83

[a] L_{10}/L_{50}.

Source: Reference 3.

Table II-5. NOISE CRITERIA USED FOR EVALUATING TRIDENT PROJECT

L level	Maximum allowable exterior noise level	Source	Comment
L_{10}	70 dBA	FHWA's PPM 90-2, Table 1	Land use category *B*: residence, motel, hotel, public meeting room, library, hospital, school, church, picnic area
L_{50}	55 dBA	EPA-NITD 300.7 *Effects of Noise on People*, p. 49, Fig. 14; and	Criteria based on outdoor speech communication interference at a conversing distance


U.S. Naval Reservation
Poulsbo
LIBERTY BAY
0
1
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MILES
Lemolo
Keyport
5
6
7
303
4
Clear Creek
Clear Creek Road
Central Valley Road
303
Brownsville
Bucklin Hill Road
3a
3c
Silverdale
3b
11
Military Road
Meadowdale
DYES INLET
Illahee

Source: Reference 3.

Figure II-6. Noise measurement stations

Table II-5 (Continued). NOISE CRITERIA USED FOR . . . TRIDENT PROJECT

L level	Maximum allowable exterior noise level	Source	Comment
		EPA *Region X Guidelines*, p. 31	of 10 ft
L_{peak} (nighttime)	60 dBA	EPA-NITD 300.7 *Effects of Noise on People*, p. 68, Fig. 17; and EPA *Region X Guidelines*, p. 3, corrected	Criteria based on 50% of the people being protected from awakening if *interior* peaks do not exceed 50 dBA
Permissible increase of ambient (L_{50}) noise level	0-5 dBA; few complaints if gradual	EPA-NITD 300.3 *Community Noise* Ch. 5; and EPA *Region X Guidelines*, p. 32, and correspondence with Region X, EPA	Ambient noise level for this study chosen as L_{50}, the outdoor median noise level (with consent of Region X, EPA); criteria based on community reaction (i.e., annoyance) to level increase above existing conditions

Source: Reference 3.

In general, the study area is of a rural and quiet nature. Any noise levels exceeding guidelines for adjacent human use activities occur along major arterial roads through the County and are the result of truck and automobile traffic. Development of the Trident Support Site in addition to normal County growth will increase noise levels at sites 3B, 4, 5, 6, 7 and 11 on the order of 2 to 13 dBA. Principal areas of high noise will be Clear Creek Road, Bucklin Hill Road and State Route 3.

FRESH WATER HYDROLOGY AND WATER QUALITY

Surface Water Hydrology

Streams

Principal streams within the study area are shown in Figure II-7. The principal streams and drainage areas are tabulated in Table II-6. Total drainage area encompassed by these creeks is 24.2 square miles, with the largest drainage area being associated with Clear Creek (7.46 square miles) (Reference 5).

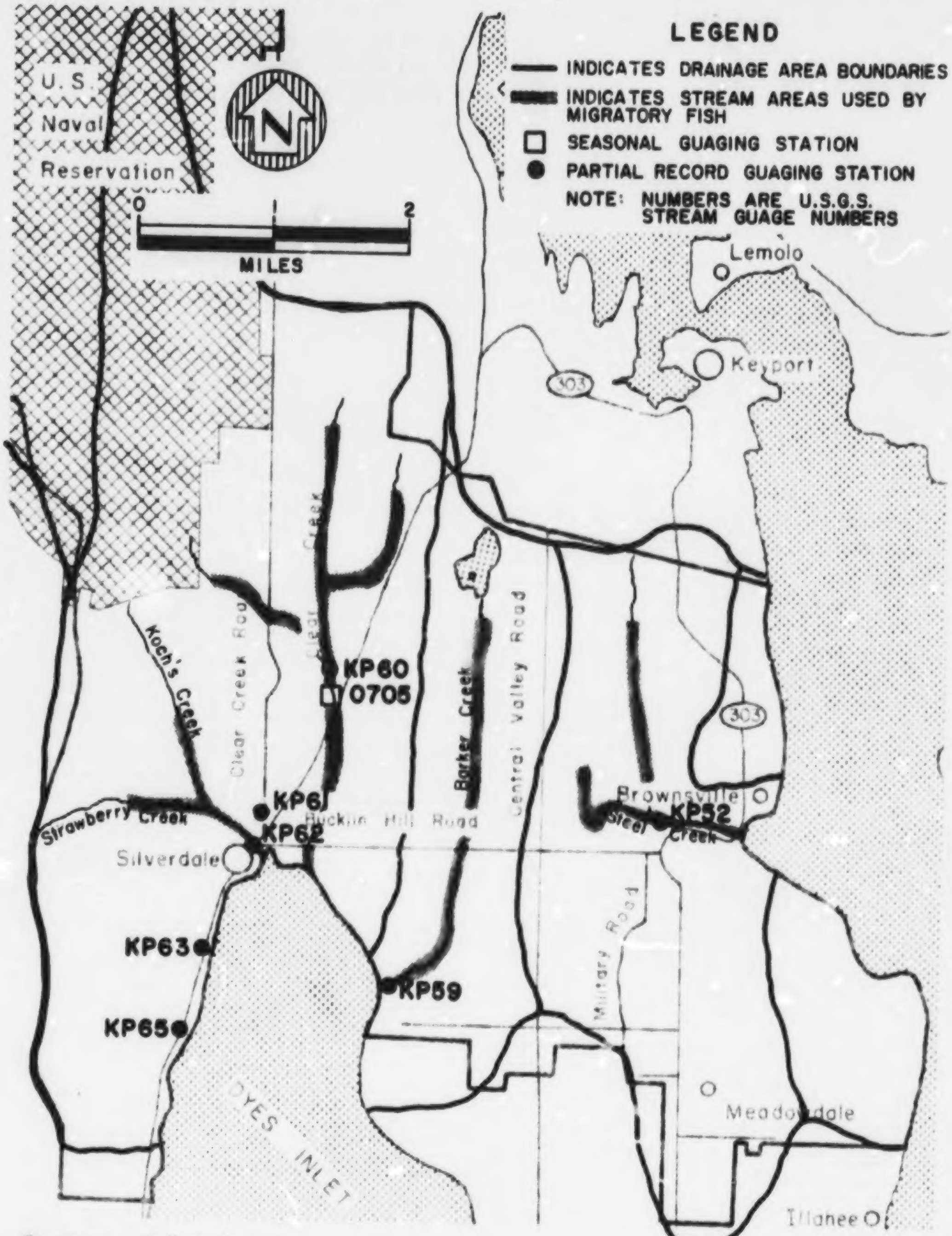
Table II-6. LOW FLOW CHARACTERISTICS OF STREAMS, CENTRAL KITSAP

Stream station number	Stream	Drainage area, sq miles	Low flow, cfs	Month/year
0705	Clear Creek	7.46	1.5	8/47
KP60	West Fork/Clear Creek	3.68	2.16	8/47
			4.56	5/71
KP52	Steele Creek	4.75	0.89	8/47
KP59	Barker Creek	4.02	1.81	8/47
KP59A	Barker Creek		0	10/47
			0.1 [a]	2/71
			0	5/71
			0	6/71
			0	8/71
			0	9/71
			0	12/71
KP61	(unnamed)	0.44	0.06	8/47
KP62	Strawberry Creek	3.01	1.08	8/47
KP63	Knapp Creek	0.28	0	8/58
KP64	(unnamed)	0.55	0.03	8/58

Source: Reference 5.

[a] Estimated.

Chemical analyses of streams, performed in 1961, indicated that surface water within the study area was of excellent quality with respect to State of Washington standards. More recent information from


LEGEND
INDICATES DRAINAGE AREA BOUNDARIES
INDICATES STREAM AREAS USED BY MIGRATORY FISH
☐ SEASONAL GUAGING STATION
● PARTIAL RECORD GUAGING STATION
NOTE: NUMBERS ARE U.S.G.S. STREAM GUAGE NUMBERS
U.S. Naval Reservation
N
0
1
2
MILES
Lemolo
Keyport
303
Koch's Creek
Clear Creek Road
Clear Creek
KP60
0705
Barker Creek
Central Valley Road
303
Brownsville
Strawberry Creek
KP61
Bucklin Hill Road
KP62
Silverdale
Steel Creek
KP52
KP63
KP59
Military Road
KP65
DYES INLET
Meadowdale
Illanee

Source: Reference 5.

Figure II-7. Location of principal streams and their drainage areas

1973-1974, including bacteriological sampling, shows a deterioration in the water quality (Reference 1). Bacteriological sampling of Clear Creek indicated that the standard on coliform count of 240/100 ml for class A water was exceeded in 90 percent of the samples. An increase in iron concentration to 0.3 mg/l was noted in the more recent information. Sampling from Burke's Creek showed that the coliform count of 1,100/100 ml was exceeded in 50 percent of the samples.

Comparison of data on surface water quality within the study area indicates a general deterioration of water quality. High coliform counts indicate possible contamination due to excessive septic tank drain field failures. Presently, data is limited to several creeks; sampling of other streams in areas where septic tank failures are known to occur would probably indicate similar deterioration in water quality.

Lakes

Island Lake is the only lake within the study region. It encompasses an area of approximately 43 acres, with drainage via Barker Creek to Dyes Inlet.

Island Lake water is of good quality and normally meets the State water quality standards for Lake Class waters. Recent (1973-1974) data from monitoring programs is summarized in Table II-7. Bacteriological sampling from 1973-1974 revealed that between 10 and 25 percent of all samples exceeded the coliform count of 240/100 ml, which is the lake standard. This fairly high percentage indicates the possibility of contamination due to septic tank drain field failures, although the observed incidents of high coliform levels have been random and do not indicate continuous discharges from malfunctioning drain fields.

Table II-7. 1973-1974 MONITORING RESULTS FOR ISLAND LAKE

Parameter	Unit	Minimum	Maximum
Temperature	°F	38	74
pH	pH	6.7	7.7
Dissolved oxygen	mg/l	8.2	13.2
Nitrate	mg-N/l	.02	.02
Phosphate	mg/l	.002	.002

Source: Reference 5.

Groundwater

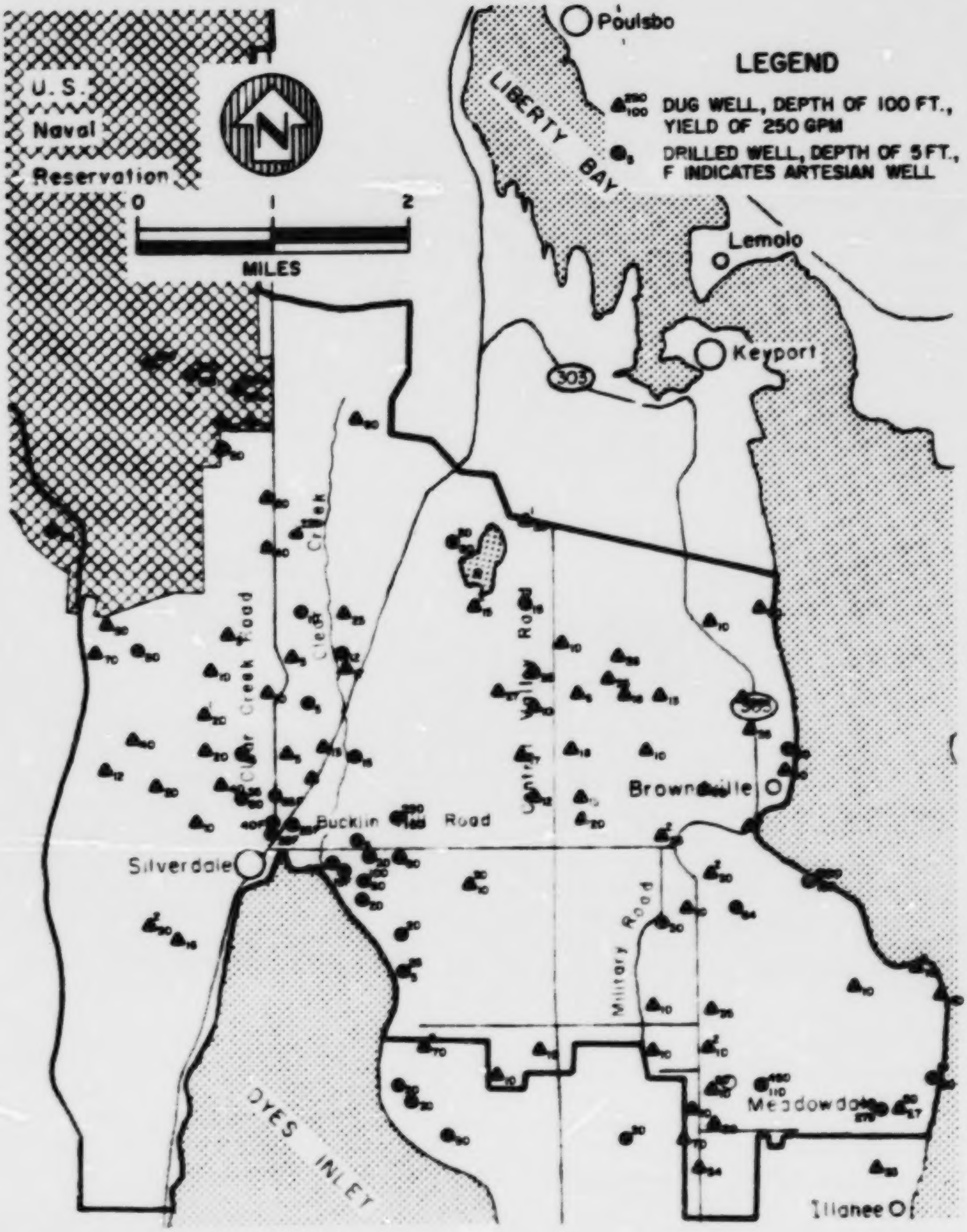
Because there are no significant surface water resources in the study area, water supply is obtained from groundwater aquifers. Figure II-8 shows the locations of wells as given in Reference 5. Well depths were computed by overlaying the elevation of the static water level on a topographic map. There are many shallow dug wells in the study area, used primarily for domestic water supply. Some well capacity data were available and are shown on Figure II-8. Well water quality is believed to be generally excellent. Well water quality data for the area are actually quite limited, but the quality of the aquifers which these wells tap is given in Table II-8. These estimates of water quality are probably valid for the deep aquifers but are only approximate for the surface aquifer, which is subject to contamination from a variety of local sources. With respect to bacteriological quality of certain of the groundwater sources within the study area, recent data were much more plentiful. Bacteriological sampling was carried out over the period from 1973 to 1974. The following discussion of well types, depths and quality is organized by geographical location.

North Silverdale

There is a large cluster of wells just north of Silverdale, some of which are artesian wells. Most of the wells are very shallow, with an average depth of approximately 20 feet. About one-half of the wells are dug wells, while the other half are drilled wells. Flow from the artesian wells ranges from 25 to 65 gallons per minute (gpm). Most of the dug and drilled wells penetrate only through the till surface layer to reach the uppermost water table. One well in the area extends beyond the till into the Colvos Sand geologic deposit, 80 feet below the ground surface. That particular well yields about 35 gpm. Much of the water obtained from the shallow wells is probably recharge from surface runoff.

Results from bacteriological sampling in the Silverdale area indicated that between 18 and 20 percent of the samples contained more than one coliform organism per 100 milliliters of sample. Although not excessive for drinking water standards, this exceeds the limit for groundwater sources, which is set at one coliform per 100 ml of sample. Uncontaminated groundwater supplies should have virtually no coliform count.

Chemical constituents of four water supplies in the Silverdale area were determined by the State Health Department during the recent study period (1973-1974). Water from these wells generally met the USPH standards for drinking water, with only a few exceptions. The


Poulsbo
LEGEND
DUG WELL, DEPTH OF 100 FT., YIELD OF 250 GPM
DRILLED WELL, DEPTH OF 5 FT., F INDICATES ARTESIAN WELL
U.S. Naval Reservation
LIBERTY BAY
0
1
2
MILES
Lemolo
Keyport
303
Clear Creek Road
Clear Creek
Central Valley Road
Brownsville
Bucklin Road
Silverdale
Military Road
Meadowdale
DYES INLET
Illanee

Source: Reference 5.

Figure II-8. Location of wells

Table II-8. WATER QUALITY OF AQUIFERS

Constituent or property, ppm	Water-bearing formational unit							
	Above Colvos Sand		Colvos Sand		Salmon Springs Drift		Below Salmon Springs Drift	
	Number of samples							
	5		14		14		4	
	Well depth, ft							
	Average	Range	Average	Range	Average	Range	Average	Range
	60	18-88	135	0-224	297 [a]	62-832 [a]	515	353-813
Silica (SiO_2)	19	17-21	26	20-38	35	29-41	36	26-41
Calcium (Ca)	13	7.0-22	8.4	5.5-11	17	9.0-30	24	12-45
Magnesium (Mg)	2.6	1.5-3.6	5.9	2.9-12	6.1	2.2-11	12	1.5-19
Sodium (Na)	6.4	2.8-11	4.6	3.1-7.5	8.9	4.6-20	22	10-43
Potassium (K)	.4	.0-.9	.5	.0-1.2	2.3	1.3-4.9	3.8	2.0-7.4
Bicarbonate (HCO_3) [b]	53	34-90	55	35-89	96	70-156	190	94-346
Sulfate (SO_4)	5.4	.2-15	3.8	.0-20	3.2	.0-15	2.0	.3-6.6
Chloride (Cl)	4.0	1.2-9.0	3.1	1.2-6.2	4.5	1.2-22	5.0	1.5-8.8
Nitrate (NO_3)	2.6	.1-4.9	2.8	.1-10	.5	.0-3.4	.2	.1-.5
Phosphate (PO_4)	.03	.00-.06	.12	.07-.26	.63	.24-2.0	.36	.19-.59
Dissolved solids (calculated)	80	58-99	83	55-120	125	94-180	201	122-338
Hardness (as $CaCO_3$)	43	29-61	45	27-77	67	46-106	110	36-190
pH (logarithmic averages)	6.5	6.1-7.9	7.3	6.8-8.0	7.8	7.3-8.5	7.9	7.6-8.3

Source: Reference 5.

[a] Sampling site number 18 (Table 55) not included because well depth is unknown.

[b] Includes carbonate (CO_3) calculated as HCO_3.

Dawn Park Estates' well exhibited high levels of iron (1.72 mg/1) and phosphate (1.77 mg/1). Kitsap Water District No. 6 showed high phosphate concentrations (2.4 mg/1).

East Silverdale

About one mile east of Silverdale, around Bucklin Hill Road, lies another group of wells. All of the wells in this area are drilled wells except for two artesian wells located near the shore of Dyes Inlet. Well depths range from five to 100 feet. The artesian wells yield a combined flow of 40 gpm, while the deepest well averages 250 gpm. Except for the artesian wells, these wells all penetrate into the Colvos Sand layer and should have the same excellent water quality characteristics as the wells in the Silverdale area.

Meadowdale

Centered around Meadowdale, in the southeast corner of the study area, is another group of wells, most of which are dug wells. Depths of the dug wells range from 10 feet to about 70 feet, with the average depth being around 25 feet. These shallow wells extend beyond the surface till into the Colvos Sand layer. There are two deep drilled wells in the area, with depths of 110 and 275 feet, producing 450 and 40 gpm, respectively. These wells extend below the Colvos Sand layer through the Kitsap Formation, thus falling into the Salmon Springs Drift category. Noteworthy also is an artesian well north of Meadowdale on the Port Orchard coast which produces about 1,500 gpm. All of the wells in the Meadowdale area yield excellent quality water. The deeper wells, drawing water from the Salmon Springs Drift Formation, yield a higher mineral content, as reflected by the higher total dissolved solids content. The increase in the bicarbonate concentration of this water has raised the average pH value, but it still remains within acceptable limits. This water is of excellent quality with respect to USPHS standards for drinking water.

Brownsville

Approximately one mile west of Brownsville lies another group of wells. Virtually all of the wells in this area are shallow dug wells with depths ranging from six to 35 feet and an average depth of 18 feet There is one drilled well, 35 feet deep, in the area. All of these wells reach into the Colvos Sand layer, thus yielding an excellent quality water (see Table II-8). Water derived from the shallow wells is probably recharge from surface runoff.

Results from recent bacteriological sampling does show, however, that about 5 percent of the samples collected from the North Perry Water District contained more than one coliform organism per 100 ml of sample. Although this exceeds acceptable limits placed on groundwater, it is still quite acceptable with respect to USPHS standards for drinking water.

Clear Creek Area

There is a small cluster of drilled and dug wells about 1.5 miles north of Silverdale, next to Clear Creek. These wells are all 25 feet or less in depth. The Colvos Sand layer in this area is very shallow; therefore, most of the wells extend through the Kitsap Formation into the Salmon Springs Drift Formation.

North Clear Creek Road

Just west of Clear Creek Road, about 3.5 miles north of Silverdale, lies a small group of dug and drilled wells. The shallower wells average 40 feet in depth, while data on the deep wells indicate depths of 125 and 200 feet. These deep wells yield 300 and 1,500 gpm, respectively. The shallower wells derive water from the till surface layer, while the deeper ones penetrate into the deep-lying Colvos Sand layer. Recent bacteriological sampling from the Clear Creek Mobile Home Park well indicated that 10 percent of the samples contained more than one coliform organism per 100 ml of sample.

With exception to bacteriological results, the water quality here should be excellent, as described in Table II-8.

Island Lake

There are a few small wells of varying depths surrounding Island Lake. These wells range from 15 to 80 feet in depth and extend as far as the Kitsap Formation. The deepest well produces 30 gpm. These wells should yield excellent quality water, but Island Lake may be a recharge area, and its quality may affect the future quality of the local groundwater.

TERRESTRIAL ENVIRONMENT

The Kitsap planning area is located within the Western Hemlock Forest Zone, which is characterized as being the most extensive vegetation zone in western Washington and Oregon and the most important in terms of timber production. The Puget Sound area is a sub-unit within the Western Hemlock Zone and contains slight differences in vegetative distribution and dominance, mainly because of climatic and soil factors (Reference 8). The topography within the planning unit is generally low-lying hills and plateaus. The elevation averages from 200 to 300 feet, with some upland ridges reaching 400 to 500 feet. The area lies in the rain shadow of the Olympic Mountains, receiving 30 to 35 inches of annual precipitation, with at least 90 percent of the precipitation falling between November and April. The amount of moisture plays an important role in the distribution and abundance of local vegetation.

Conifers originally covered almost the entire study area. Since the arrival of European man and his subsequent land uses, the vegetation has changed to its present mosaic, which can be characterized as being composed of seven biotic communities: (1) Coniferous Forest, (2) Broadleaf Forest, (3) Mixed Coniferous/Broadleaf Forest, (4) Pasture/Meadow, (5) Freshwater Marsh, (6) Residential and (7) Marine Shoreline. There is considerable intergrading of species within these units, and they should not be viewed as distinct entities. The distribution of these units is largely a function of climate, relief, substrate and the occurrence of fire, grazing, logging and other human activities. The Coniferous Forest is the predominant unit, the wet, mild, maritime climate being favorable to the growth of conifers. Hardwoods are generally subordinant except in stressful habitats, in recently disturbed areas or in specialized habitats such as riparian zones (Reference 9).

The fire potential during the short dry season in the Puget Sound area is very high. Historically, there were many large, destructive fires before the introduction of fire suppression measures in the early 1900's. In the past 24 years, there has been only one small wildfire, of 62 acres, in Kitsap County (Reference 10). Before the arrival of civilization, fire was part of the natural ecology, and periodic groundfires that burned slash and debris kept the fuel load from becoming excessive. In fire ecology, the most important factor is the presence of fuel to carry a fire. Many of the forest stands have an accumulation of downed timber, slash and brush that provide a continuous ladder of fuel from ground to canopy. A wildfire in such an area in the dry summer months would be extremely difficult to control.

No rare or endangered plant species are found within the planning area (Reference 11). Representative vegetation and wildlife for each biotic community are presented in Table II-9. A more complete listing of species and occurrence is given in Appendix D.

Of the wildlife occurring within the study area, the American peregrine falcon (*Falco peregrinus anatum*) is the only species considered to be endangered (Reference 19). Because of urbanization, forest-clearing and other changes in land use, this bird is probably transient and does not depend on specific parts of the study area as a permanent or primary habitat. Outlying regions beyond the study area which are less disturbed and closer to their natural habitat may attract and support a small peregrine falcon population.

No endangered mammalian species are recognized within the study area (Reference 20); however, several rare species which may exist in the study area have been identified by the Washington State Game Department. These are the mountain lion (*Felis concolor*), sea otter (*Enhydra lutris*), fisher (*Martes pennanti*) and western gray squirrel (*Sciurus griseus*). The Game Department definition of rare is: "A rare species or subspecies ... that, although not presently threatened with extinction, is in such small numbers throughout its range that it may be endangered if the environment worsens" (Reference 20).

The seven biotic communities within the study area are shown on Figure II-9 and are described in Appendix E.

Proposed Treatment Plant Site

North Brownsville Site

The proposed site is adjacent to Highway 303, approximately 1.5 miles north of Brownsville, as shown in Figure II-10. The site is situated within a 30- to 35-acre stand of Mixed Coniferous/Broadleaf Forest. The land slopes gradually to the southwest in a wide mound beginning near the northeast corner. The southern and eastern edges of the site descend toward open field and a freshwater marsh zone, as depicted in Figure II-10. Several small springs were apparent during a winter 1975 field survey. Water seepage originated within the wooded areas and probably indicates a high groundwater table.

The wooded stand is predominantly immature Douglas-fir and western red cedar, with a scattered association of bigleaf maple and red alder in semi-open areas. The understory is generally shaded and moist, with much tree litter and downed wood. The ground cover is patchy and concentrated mainly in clearings with maximum light penetration. Typical ground vegetation includes lady fern, sword fern, salal, Oregon grape, holly and a seasonal environment of mosses and fungi.

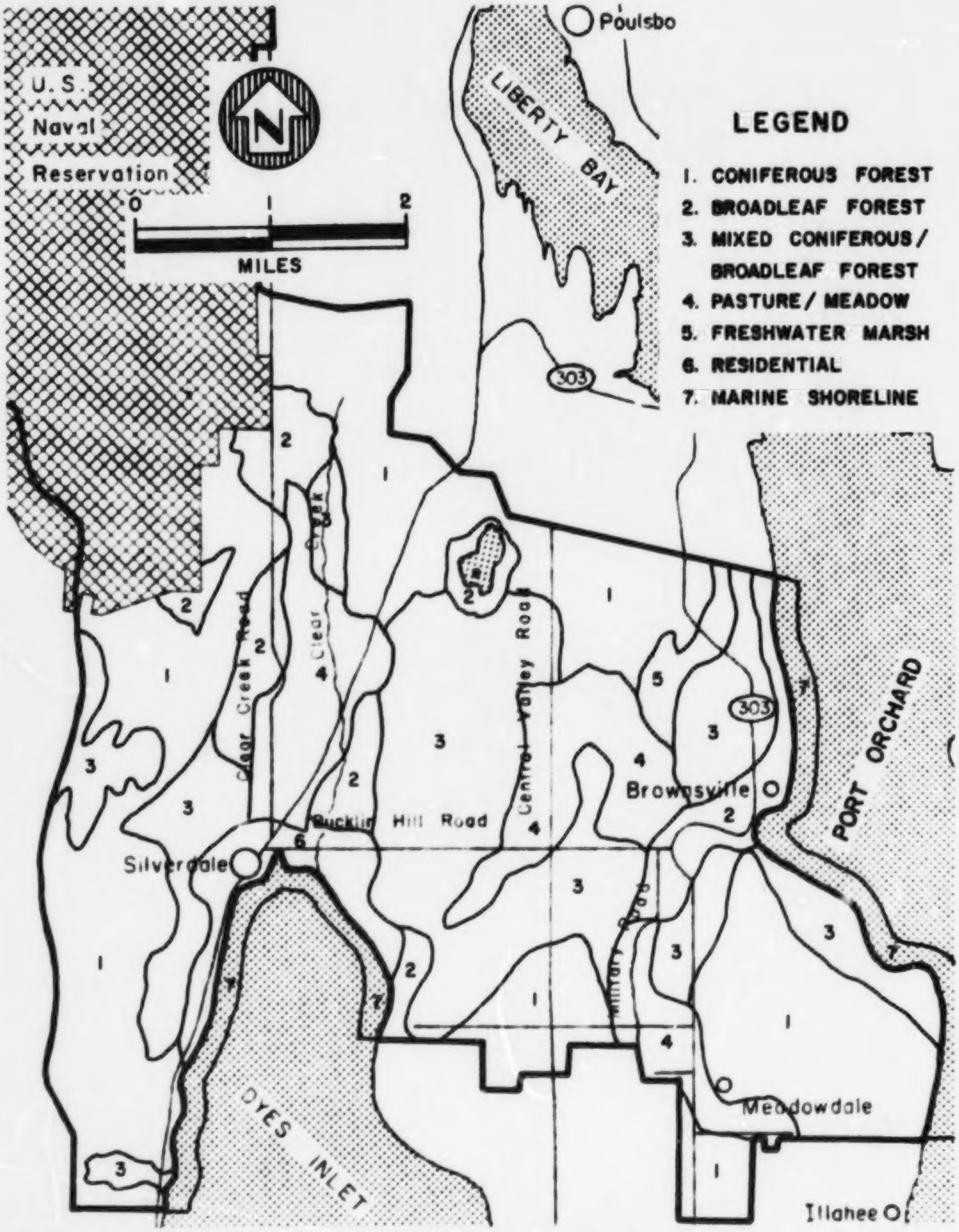
Table II-9. BIOTIC COMMUNITIES OF CENTRAL KITSAP COUNTY

Community	Locations and examples	Characteristic vegetation	Characteristic wildlife
Coniferous Forest	Major portions of central Kitsap County, as shown in generalized vegetation map. Large stands may be seen west of Chico, above Meadowdale and near the Bangor Naval Reservation.	A forest of Douglas-fir with scattered mature trees over a stand of younger plants. Associated trees are red alder and western white pine, with smaller western redcedar and western hemlock. Where light permits growth, evergreen huckleberry, salal, Oregon grape, Pacific dogwood, Indian plum, sword fern, hawthorne, twin flower, rose, *Rubus* spp., red huckleberry, and willows are found. The roadsides support Scotch broom, orange honeysuckle, hardhack and a variety of common herbs. Red rhododendron is found throughout this zone.	Birds: band-tailed pigeon, Cooper's hawk, blue and ruffed grouse, screech owl, olive-sided flycatcher, Steller's jay, raven, chestnut-backed chickadee, red-breasted nuthatch, brown creeper, golden-crowned kinglet, Townsend warbler. Animals: black bear, raccoon, striped skunk, snowshoe hare, coyote, Townsend chipmunk, northern flying squirrel, beaver, red-backed vole, Townsend vole, bats, Pacific jumping mouse, rough-skinned newt, Pacific giant salamander, northern alligator lizard, red-backed salamander, long-toed salamander, garter snake, Pacific treefrog.
Broadleaf Forest	Interspersed between coniferous forest generally occurring in lowland, wetter areas that have been previously cleared. Groves found along sections of Clear Creek Road, around Island Lake and Burke Bay and coastal bluffs above Brownsville.	An alder forest with cascara, bigleaf maple, Douglas-fir and western hemlock. Undergrowth is mainly salmonberry, blackcap, sword fern, buttercup, bedstraw, red huckleberry and red elderberry.	Birds: screech owl, red-tailed hawk, mourning dove, western wood pewee, downy woodpecker, black-capped chickadee, Bewick's wren, cedar waxwing, Oregon junco, vireos, golden-crowned kinglet, yellow warbler, orange-crowned warbler, western tanager, purple finch, fox, song and white-crowned sparrows. Animals: black bear, raccoon, mink, striped skunk, coyote, red fox, Townsend chipmunk, deer mouse, cottontail rabbit, bats, northwestern and Pacific giant salamander, rough-skinned newt, northern alligator lizard and garter snake.
Mixed Coniferous/ Broadleaf Forest	Mixed stands occur along Bucklin Hill Road, north of Brownsville, and west of Silverdale.	A forest of Douglas-fir, western redcedar, bigleaf maple, Pacific dogwood, red alder, and western hemlock. In the understory are salal, evergreen huckleberry, red huckleberry, salmonberry, cascara, violet, buttercup, coast rhododendron, red currant, miner's lettuce, Oregon grape, and starflower. Open edges support willows, Scotch broom and common herbaceous species.	Birds and animals: Wildlife is similar to the coniferous zone mentioned earlier, but also supports more seed- and fruit-eating animals such as cedar waxwing, western tanager, warblers and sparrows.

Table II-9 (Continued). BIOTIC COMMUNITIES OF CENTRAL KITSAP COUNTY

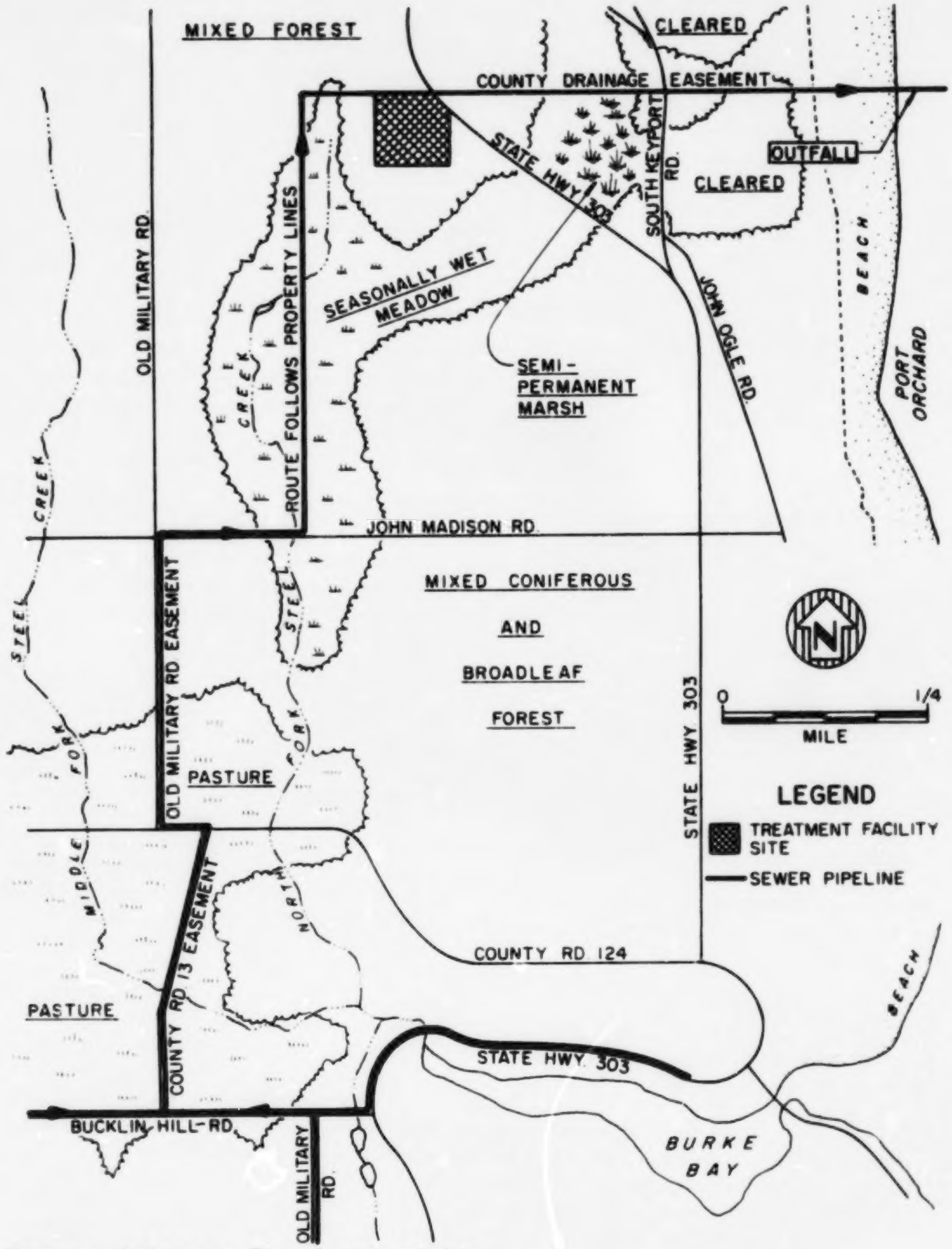
Community	Locations and examples	Characteristic vegetation	Characteristic wildlife
		Riparian vegetation. Typical riparian vegetation is western redcedar, vine maple, red alder, devil's club, skunk cabbage, stinging nettle, American brooklime, false Solomon's seal and wild lily-of-the valley.	Birds and animals: Edge community particularly favored by wildlife such as the song and fox sparrow, American goldfinch, dipper, veery, Swainson's thrush, vireos, rufous hummingbird, Bullock's oriole, raccoon, all shrews, most mammals, Pacific tree-frog, most salamanders and rough-skinned newt.
Pasture/ Meadow	Farmland and sparse residential areas along Clear Creek Valley, Central Valley Road and the Rolling Hills developed area.	Red alder and willows. On the drier margins are Douglas-fir and western white pine. The meadow species include a variety of grasses, salmonberry, blackcap, ox-eye daisy, sword fern, rushes, field mint, buttercup and other more common species.	Birds: marsh hawk, barn owl, short-eared owl, say's phoebe, violet-green swallow, common crow, mountain bluebird, gray partridge, killdeer, western meadowlark, horned lark, American goldfinch, Brewer's blackbird, brown-headed cowbird, savannah sparrow. Animals: pocket gopher, white-footed mouse, Pacific jumping mouse, coyote, boreal toad, northwestern and red-sided garter snake.
Freshwater Marsh	As reported in Reference 1. Relatively flat, small plain near upper portion of the north fork of Steel Creek above Burke Bay.	A very wet lowland area supporting a variety of grasses, rushes, buttercup. Horsetails, skunk cabbage, cattails and watercress, with occasional red alder and willows. Occasional Douglas-fir in the drier areas.	Birds: marsh hawk, sparrow hawk, killdeer, barn swallow, cliff swallow, mallard and other ducks, common crow, long-billed marsh wren, yellowthroat, red-winged blackbird, fox and song sparrow. Animals: raccoon, coyote, vagrant and other water shrews, Townsend and long-tailed voles, northwestern and long-toed salamanders, Pacific treefrog, bullfrog and red-legged frog.
Residential	Silverdale and other small communities such as Brownsville and Meadowdale. Scattered homes with some landscaping along north perimeter of Dyes Inlet, bluffs facing Port Orchard and Central Valley.	Bigleaf maple, Douglas-fir, Scotch broom, ocean spray, red rhododendron, pea, curly dock and thistle are common in residential areas. Many exotic species have been introduced in landscaped areas.	Birds: barn and cliff swallow, crow, bushtit, mockingbird, robin, cedar waxwing (seasonal), warblers (seasonal) house sparrow, house finch, song sparrow and American goldfinch. Animals: deer mouse, Townsend vole, cottontail rabbit, feral cat, boreal toad, Pacific treefrog and northwestern garter snake.
Marine Shoreline	Sand and gravel beaches bordering Port Orchard and sandy-to-rocky northern perimeter of Dyes Inlet.	Cord grass, gumplant, curly dock, rushes, bulrush and hairy cat's ear are found on beach areas.	Birds: great blue heron, kildeer, greater and lesser yellow leg, dunlin, common snipe, least and spotted sandpiper, short-billed dowitcher, common and Caspian tern, western and red-necked grebes, ducks such as mallard, greater scaup, goldeneye, bufflehead, and various seagulls such as Thayer's, ring-billed, Bonaparte's, glaucous-winged, California and mew gulls.

Sources: References 12, 13, 14, 15, 16, 17 and 18.


U.S. Naval Reservation
N
0
1
2
MILES
Poulsbo
LIBERTY BAY
LEGEND
1. CONIFEROUS FOREST
2. BROADLEAF FOREST
3. MIXED CONIFEROUS/BROADLEAF FOREST
4. PASTURE/MEADOW
5. FRESHWATER MARSH
6. RESIDENTIAL
7. MARINE SHORELINE
303
Clear Creek Road
Clear Creek
Central Valley Road
Bucklin Hill Road
Silverdale
Brownsville
PORT ORCHARD
Military Road
Meadowdale
DYES INLET
Illahee

Source: Reference 1; adjusted after site surveys.

Figure II-9. Generalized vegetation map of study area


MIXED FOREST
CLEARED
COUNTY DRAINAGE EASEMENT
OUTFALL
STATE HWY 303
SOUTH KEYPORT RD.
CLEARED
OLD MILITARY RD.
ROUTE FOLLOWS PROPERTY LINES
SEASONALLY WET MEADOW
CREEK
SEMI-PERMANENT MARSH
JOHN OGLE RD.
BEACH
PORT ORCHARD
STEEL CREEK
JOHN MADISON RD.
MIXED CONIFEROUS AND BROADLEAF FOREST
N
0
1/4
MILE
STATE HWY 303
OLD MILITARY RD EASEMENT
STEEL FORK
NORTH FORK
PASTURE
MIDDLE FORK
LEGEND
TREATMENT FACILITY SITE
SEWER PIPELINE
COUNTY RD 13 EASEMENT
COUNTY RD 124
PASTURE
BEACH
STATE HWY 303
BUCKLIN HILL RD
OLD MILITARY RD.
BURKE BAY

Source: Reference 61 and site visits

Figure II-10. Proposed north Brownsville site

Adjacent to the site, the wooded area borders a pasture with a stream and seasonal marsh occypying the lower areas. The demarcation between forest and open field is sharp and often linear, following lot lines. At the present time a farmhouse and barn on the site are occupied; however, several old wooden structures for hay storage and animal shelter are scattered through the woods. Due to the predominance of Douglas-fir over maple and alders, wildlife on the site would be characteristic of a Coniferous Forest community. Animal numbers are generally low due to the uniformity of the wooded area and its limited understory. In addition, domestic animals--particularly cattle--roam freely throughout the area, disturbing the natural environment.

Proposed Pipeline Routes

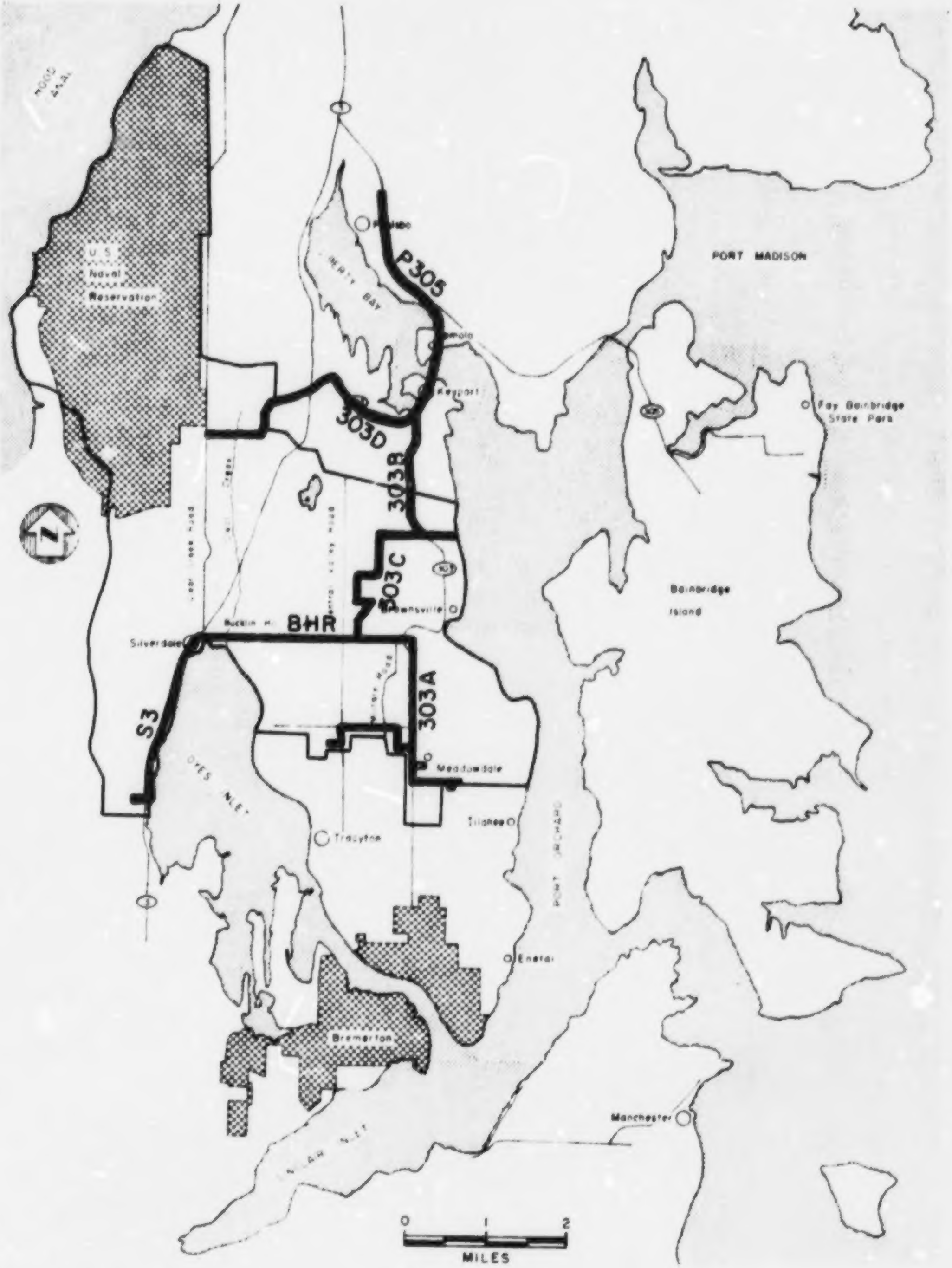
The expanded proposed pipeline routes are shown on Figure II-11. Biotic communities which would be traversed by the pipelines are presented in Table II-10. The majority of the pipeline routes will be within the road or the roadway right-of-ways.

One pipeline route with significant sections which pass through vegetated areas and which does not follow established roads is discussed in detail below. This route (303C) connects the Bucklin Hill Road interceptor with the Brownsville treatment plant site and includes the route from the treatment plant to the outfall site in Port Orchard.

Pipeline Route 303C

The exact alignment of this pipeline segment is shown in Figure II-10. Three sections of the alignment pass through sensitive biotic communities: (1) a wetland ecosystem between Madison Road and the proposed Brownsville treatment plant site, (2) a freshwater marsh between the treatment plant site and South Keyport Road and (3) a steep ravine on the last 600 feet of alignment descending to the beach at Port Orchard.

The pipe alignment between Madison Road and the treatment plant site traverses low farmland within the drainage course of the north fork of Steel Creek. The creek originates in springs within the wooded area of the treatment plant site and flows southward, forming several small ponds. During the wet season, the low pasturelands and woodlots in the vicinity of the site become waterlogged because of high groundwater table. The grassland area is generally poorly drained and unsuitable for agriculture. The extent of the wetlands varies greatly between seasons and can be classified as forested swampland intergrading into grassy marshland, which further drains into an open riparian


U.S. Naval Reservation
P305
303D
303B
303C
BHR
303A
S3
Poulsbo
Keyport
PORT MADISON
Fay Bainbridge State Park
Bainbridge Island
Brownsville
Silverdale
Bucklin Hi
Meadowdale
Tracyton
Illahee
PORT ORCHARD
Enetai
Bremerton
Manchester
DYES INLET
0
1
2
MILES

Source: References 1 and 61

Figure II-11. Amended proposed alternative pipeline routes

Table II-10. BIOTIC COMMUNITIES NEAR PROPOSED PIPELINE ROUTES

Pipeline route	Location and description	Biotic communities[a] traversed, approx. %							Comments
		1	2	3	4	5	6	7	
S3	Chico to Silverdale, along Highway 3. Level.			67			33		
BHR	Bucklin Hill Road from Highway 3 to Highway 303. Over ridge; level.		8	50	17		25		
303 A	Meadowdale to Bucklin Hill Road on Highway 303. Relatively flat.		8	26	66				
303 B	Highway 303, from Bucklin Hill Road to Keyport.	50	25	19		6			
303 C	From Bucklin Hill Road north 2 miles to Brownsville treatment plant site with 3 stream crossings. From treatment plant site east 0.6 miles to outfall site C at Port Orchard. Gradually sloping terrain with farmlands and small wooded lots.	10	5	10	30	30	10	5	2 miles of route does not follow roads; see text.
303 D	Bangor Naval Reservation to Mountain View Road east and following Highway 303 to Keyport. Undulating hills, completely follows road easements.		20	30	50				

[a] Key to Biotic Communities:
1 - Coniferous Forest
2 - Broadleaf Forest
3 - Mixed Conifer/Broadleaf
4 - Pasture/Meadow
5 - Freshwater Marsh
6 - Residential
7 - Marine Shoreline

strip (Steel Creek). Aquatic vegetation is seasonal and is limited to mosses and scattered rushes, while wildlife is limited to a few orders of aquatic insects, amphibians, some migratory ducks and almost no fishes.

The freshwater marsh between the treatment plant site and South Keyport Road was at one time contiguous with the marsh area, described in the preceding section, at the origin of Steel Creek. Highway 303 now separates the marshes, but the habitat type remains similar for the two areas. The roadbed forms a drainage barrier for the upper marsh and induces an enclosed, permanent marsh environment. The pond area is fringed with rushes and cat-tails; common wildlife includes the red-winged blackbird, various ducks, the Pacific treefrog and the red-legged frog.

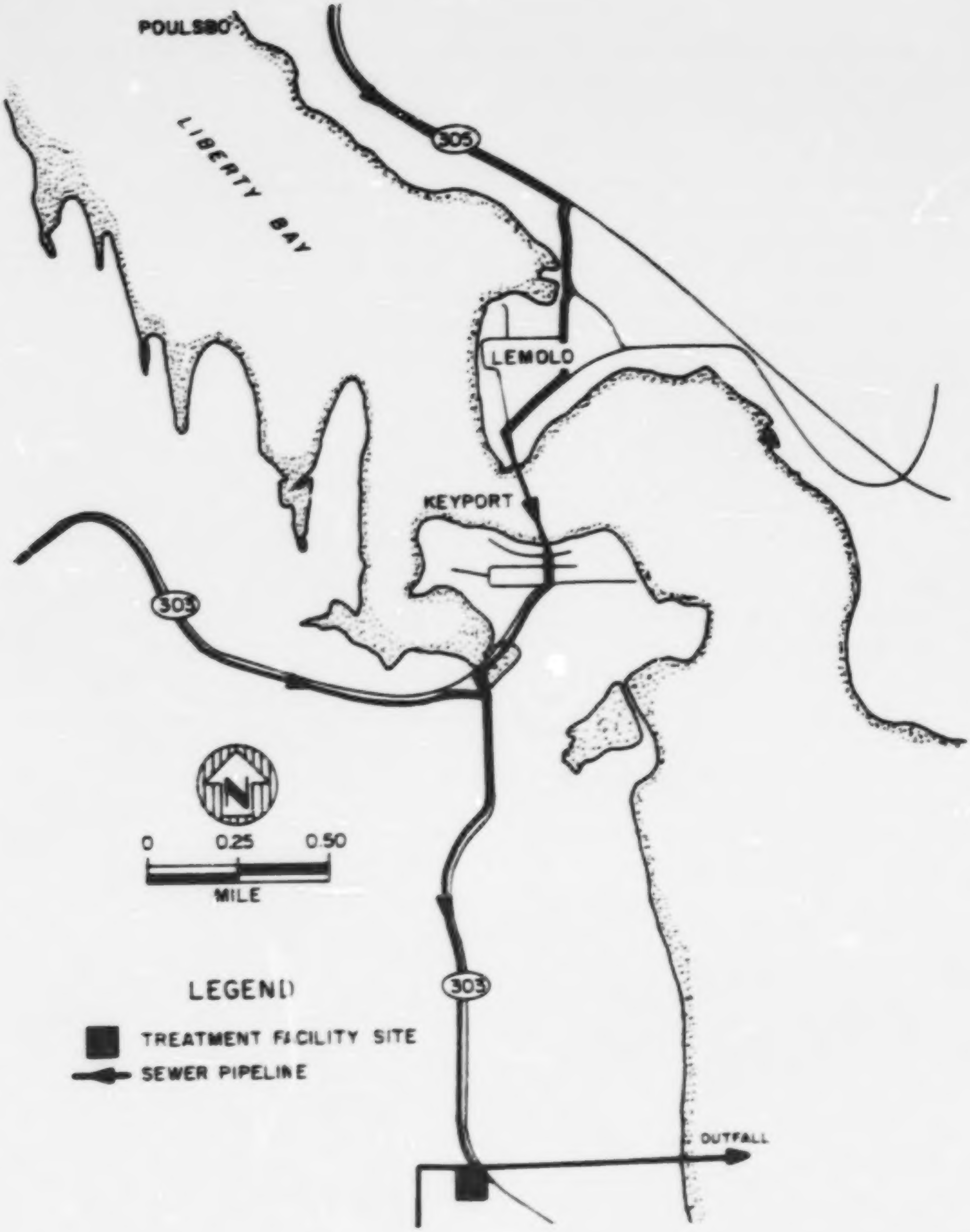
The last segment of the pipeline route follows a narrow ravine which descends 200 feet to Port Orchard channel. The open ravine is relatively steep (30 to 40 percent slope in places) and is marked by a small, permanent spring at the head of the ravine. The adjoining Broadleaf Forest areas are extremely steep, with cliffs dropping 100 feet vertically to the beach. A visual inspection of the cliff strata revealed 10- to 30-foot layers of alternating sand and gray clay. During the wet season, continuous water seepage within the upper 10 to 20 feet of the cliff area causes random slumping in the clay layers. The ravine itself was apparently formed by gradual erosion and is lined with considerable thicknesses of water-saturated clay. The sides of the ravine are thickly vegetated with alder, bigleaf maple, vine maple, salal, Oregon grape, salmonberry, lady fern and sword fern. The center of the ravine supports only a fragile ground cover of youth-on-age and *Synthyris* over the unstable clay substrate.

Pipeline Routes 303D and 305

Figure II-12 has been provided to show the detailed location of proposed pipeline segments through Lemolo and Keyport. Pipeline routes 303D and 305 would be constructed entirely within the right-of-ways of existing roads, as would all other remaining pipeline segments with the exception of the crossing of Liberty Bay.

MARINE WATER QUALITY REGULATIONS AND STANDARDS

Marine waters adjacent to the study area have been designated as Class AA (Extraordinary), with the exception of Dyes Inlet and Sinclair Inlet, which have been designated Class A (Excellent). Criteria for these classes are included as Appendix F and include numerical values


POULSBO
LIBERTY BAY
305
LEMOLO
KEYPORT
305
0
0.25
0.50
MILE
LEGEND
TREATMENT FACILITY SITE
SEWER PIPELINE
303
OUTFALL

Source: Reference 61

Figure II-12. Interceptor routes through Lemolo and Keyport

for some parameters and qualitative nondegradation statements. Applicable standards for streams and lakes are also included in the appendix. Some of the more significant criteria are shown in Table II-11. These standards apply throughout the water body except within a limited initial mixing zone surrounding a wastewater discharge.

Table II-11. WATER QUALITY STANDARDS FOR MARINE WATERS

Characteristic	Unit	Class	
		AA Extraordinary	A Excellent
Total coliform	MPN/100 ml	< 70	< 70
Dissolved oxygen	mg/l	> 7.0	> 6.0
pH	pH	7.0 - 8.5	7.0 - 8.5
Temperature	°F	< 55	< 61

Within the initial mixing zone surrounding a wastewater discharge, State of Washington standards prohibit acute biological shock, which means "that dose or circumstance which has been demonstrated by field or laboratory observation to directly result in mortalities of food, game, or commercial fish species."

In order to meet the water quality standards, point sources of wastewater are regulated by means of the NPDES or permit system. Permits define the minimum quality of discharged effluent that will maintain compliance with water quality standards. Under the provisions of the Federal Water Pollution Control Act Amendments of 1972, publicly owned treatment plants must provide at least *secondary treatment* by mid-1977 and *Best Practicable Waste Treatment Technology* by mid-1983. Secondary treatment is defined numerically as shown in Table II-12. Best practicable waste treatment technology is presently defined as secondary treatment plus any additional treatment required to meet water quality standards. Thus it is apparent that all alternatives will require secondary treatment; however, some may require further treatment in order to meet water quality standards.

Table II-12 FEDERAL SECONDARY TREATMENT EFFLUENT REQUIREMENTS

Characteristic	Unit	Value	
		Monthly average	Weekly average
Biochemical oxygen demand (five-day)	mg/l	30	45
Suspended solids	mg/l	30	45
Fecal coliform	no./100 ml	200 [a]	400 [a]
pH	pH	6.0 to 9.0	

[a] Geometric mean.

PHYSICAL MARINE ENVIRONMENT

The study area is surrounded by Puget Sound and its inlets and canals. Puget Sound is connected to the Pacific Ocean by the Strait of Juan de Fuca and Admiralty Inlet, through which most of the Sound's oceanic waters enter. Puget Sound is a deep fjord-like embayment covering approximately 2,500 square miles. Water depths of 600 feet are typical in the central basin near Seattle, and maximum depths extend to 930 feet. Theoretically, the entire volume of the Sound's waters is believed to be replaced about twice a year. Considerable variation occurs between the extremities and the central basin, however, and flushing efficiency varies widely on a monthly basis. Tidal exchange of Sound waters with incoming ocean waters varies with depth and density characteristics. Submerged sills within the Sound tend to restrict the exchange of some of the colder bottom waters which are stratified at depth. The exchange of the upper waters, however, is relatively efficient.

The shallow sills are critical in controlling the mixing and the nature of the water which contributes to the deep waters in the inner basins of Puget Sound. Mixing by surface cooling during the winter and by flow across sills tends to equalize oxygen and nutrient salts vertically through the water. Because of this mixing and the tidal exchange that occurs with waters of the open ocean, the water of Puget Sound is well supplied with oxygen and with mineral salts necessary to support aquatic ecosystems. Consequently, Puget Sound provides a rich habitat for a diverse community of organisms.

The Puget Sound subsystem most affected by the proposed alternative is the Port Orchard subsystem, which includes Sinclair Inlet, Dyes Inlet and Liberty Bay.

MARINE WATER QUALITY

Information on the quality of waters in the study area has been recorded as far back as 1932. The following paragraphs are summarized from the Draft Facilities Plan (Reference 1), which itself summarizes data obtained from a multitude of sources.

Point Jefferson to Blakely Harbor: extraordinary water quality, with only occasional violations of standards, deemed to be due to natural causes.

Port Orchard: generally extraordinary water quality; frequent violations of bacteriological and turbidity standards in the Burke Bay/Brownsville area.

Rich Passage: extraordinary water quality, with only occasional violations of standards, probably due to natural causes.

Dyes Inlet/Port Washington Narrows: generally excellent water quality; frequent violations of coliform standards and occasional violations of dissolved oxygen standards.

Sinclair Inlet: average water quality conditions; considered acceptable, but frequent violations of the coliform standards.

In conclusion, marine water quality conditions in the study area might be described as excellent but with local bacteriological problems in areas that are subject to only mild flushing.

Waste Disposal and Water Quality

The effects of wastewater disposal upon the receiving environment are dependent upon the quality of the discharge, the dilution it receives in the receiving water and the nature of the receiving water. Appendix J explains the mechanism by which dilution is accomplished in the marine environment and clearly defines the difference between initial dilution and subsequent dispersion and flushing. It is the cumulative effect of each type of dilution process that determines the suitability of a site for treated wastewater disposal.

Initial Dilution at the Proposed Site

The following calculations of resultant water quality at this outfall site were performed by Engineering-Science, Inc. using a methodology separate and different from those discussed in Appendix J.

Two approaches to the calculation of initial dilution are generally used. The first approach is based on a mathematical model of dilution produced when a buoyant plume rises in a stratified liquid, which is in itself based on tests conducted in laboratory tanks. This approach is embodied in the PLUME model used by Parametrix to calculate initial dilution. The second approach is based on the continuity equation:

$$C_o = \frac{ubd}{Q}$$

where

C_o is the initial dilution

u is the current speed across the diffuser, ft/sec b is the diffuser length, ft

d is the effective depth, ft

Q is the wastewater flow rate, cfs

Irrespective of diffuser port configuration and sizing, the maximum initial dilution can be calculated in this way on the basis of the amount of clean water available for wastewater dilution that is passing over the diffuser. In most situations the latter approach provides a more reliable indicator of a site's potential from the point of view of initial dilution.

If it is assumed that an initial dilution of 100:1 is a desirable goal, that one-half of available total depth is the effective mixing depth and that a reasonable rule of thumb for diffuser length, based on hydraulic considerations, is 50 feet per mgd, then a minimum current-speed necessary to obtain this dilution can be calculated. The frequency of occurrence of this current-speed, and consequently dilution, can then be estimated from University of Washington information on frequency of occurrence of current speeds (Reference 53), as shown in Table II-13.

Table II-13. PERCENT OF TIME SITE PROVIDES 100:1 OR MORE INITIAL DILUTION

Discharge site	Depth, ft.	Frequency		
		Spring	Neap	Average
North Port Orchard	40	83	60	71

Table II-14 compares applicable water quality standards with effluent from a secondary treatment plant which has been subject to dilutions of 10:1 and 100:1. Although this is a crude comparison and does not take account of complex interactions between waste constituents and water quality, it does demonstrate that at any disposal site which experiences *good* flushing action it is reasonable to expect that secondary treatment will be sufficient to meet the standards. Available data permit only a rough estimate of 95 to 99 percent of the time at dilution will be 10:1.

Dilution Due to Circulation and Flushing

The proposed disposal site is at north Point Orchard, where an outfall would be located about 1.5 miles north of Brownsville. Discharge would be out into the deep water in the Port Orchard basin. Excluding the effects of shoreline surface tension and possible laminar flow through Agate Passage, model results for this area are probably accurate. Strong currents coming from Agate Passage and Liberty Bay provide good

Table II-14. WATER QUALITY STANDARDS AND ESTIMATED DILUTED WASTE CONCENTRATIONS

Characteristic	Estimated waste concentration			
	AA standard	Secondary effluent [a]		
		Undiluted	Diluted 10:1	Diluted 100:1
Total coliform, MPN/100 ml	70	1,000	180	11
Dissolved oxygen, mg/l	7	3	7	7.9
pH	7 - 8.5	6 - 9	7.8 - 8.1	8
Toxicity, t.u. [b]		1.25	0.12	0.01
Ammonium [c], mg/l		20 - 25	2 - 2.5	0.2 - 0.25
Chlorine, mg/l		0.1 - 0.5	0.01 - 0.05	0 - 0.005

[a] Assumed background for secondary effluent is 100 MPN/100 ml for total coliform; 8 mg/l for dissolved oxygen; 8.0 pH value.

[b] Assumes dechlorination of effluent.

[c] Can be significantly reduced by extending biological treatment period.

mixing in this basin. An approximate dilution ratio was calculated on the assumption that the northern Port Orchard basin, exclusive of Liberty Bay, is a complete-mix basin. It was also assumed that all net flow into or out of the basin occurs through Agate Passage and that the basin is separated from Port Orchard at Battle Point.

Calculations were made during the preparation of this report to confirm the good mixing observed in the Port Orchard basin section of the model study. It was assumed that an eight-foot tide occurs and that the effluent will be completely mixed in this basin after the two days it takes to reach equilibrium concentrations. With a tidal exchange of 25 percent each tidal period, a dilution of one part effluent to 5,000 parts water was estimated. This dilution is considered accurate within an order of magnitude. Adverse wind conditions, local eddies, etc. could reduce effective mixing. This site is estimated to have fair initial dilution and good subsequent dispersion and flushing. Marine water quality standards should be consistently met, and often exceeded, with the discharge of properly treated secondary level effluent at this site.

BIOLOGICAL MARINE ENVIRONMENT

The Marine ecosystem within the waterways, inlets and passages of Puget Sound is a complex system with myriad links and multiple affecting factors. The Kitsap County marine environment has been described in detail in *Basic Data and Related Sources to Shorelines* and in Appendix D, *Kitsap County Shoreline Inventory* (Reference 22). The inventory was compiled from marine biological records of the Bureau of Sports Fisheries and Wildlife, Department of Interior in conjunction with Evergreen State College and the North Kitsap Marine Environmental Center, Poulsbo, Washington. Portions of this report are quoted extensively below.

Marine Vegetation

> *Vegetation in saltwater and estuarine areas of Puget Sound and connected waterways is very important to the marine environment. Marine vegetation can provide the following benefits: stabilization of the beach shore system and the subtidal shore system; an environment for wildlife, benthic and other marine life; energy through the photosynthesis process; increased productivity in the marine environment; food for all forms of marine life. Examples of marine vegetation are kelp, eel grass (Zostera), green and brown algae--commonly known as seaweed--and other forms of floating plants.*

Eel grass and kelp are important dominants and are discussed below.

Eel Grass

> *Eel grass can be found in areas with high water salinities, moderate water currents and semistable sandy bottoms, and usually at depths lower than one foot below mean lower low water. Eel grass is a cyclical* [seasonal] *plant that thrives in warm water temperatures ...* [from 10°-20°C during the summer, being dormant in cooler fall and winter water temperatures, below 10°C]. *Eel grass is a food source for black brant, detritous feeders such as limpets and snails, and other marine life. The heavy beds of underwater eel grass provide ...* [excellent] *photosynthetic food production capability. They are used by spawning herring and provide nursery areas for small shore fishes and salmonids. The eel grass beds also provide habitat for certain benthic organisms and crustaceans.*

Kelp

> *Kelp beds can be readily seen at low tides along rocky shorelines where current flow is swift and water salinities are high. A long, whip-like cord, anchored at one end to a rock or other object, ...* [extends upward 30 to 60 feet toward the surface to a mass of long, tough fronds]. *Kelp beds provide a dense, jungle-like environment at mid-depth in the water column, like large underwater trees. Kelp beds are prime habitat areas for fish such as copper rock cod, kelp cod, kelp crab, perches and other small fish.*

Marine Habitat

The marine shorelines of the study area can be grouped into three habitat zones. This classification provides a basic understanding of the general character of shorelines and the associated marine life.

River-Creek Mouth

> *The river-creek mouth may either be an open system* [e.g., Chico Creek on lower Dyes Inlet] *or be enclosed by a system of sand spits ...* [or one that has resulted from human intervention (Clear Creek on upper Dyes Inlet)]. *Sand and silt usually comprise the bottom materials. For anadromous fish (salmonids) spawning in tributaries to these areas, the salt/fresh water area is used by descending young salmonids for feeding, as a transition zone between fresh and saltwater, and as a refuge from predators. The substrate in these areas provides and harbors organisms that are extensively grazed upon by juvenile pink and chum salmon. Other fish make extensive use of these areas for feeding and as a nursery area. Such fish include starry flounder, stickleback, eulachon, surf perch, sculpin, Pacific herring, surf smelt and various species of flounder and sole. Some fish may spawn in these areas. At depths greater than one foot below mean lower low water, eel grass may be present.* [Pacific herring and surf perch may spawn here.] *Dungeness crab (particularly juveniles) feed extensively in this type of habitat during the summer and fall months. Shrimp usually inhabit the bottom substrate. If bottom conditions are favorable, clams may be found in the sediment.*

Steelhead, salmon and cutthroat trout have been observed in the lagoon at the mouth of Clear Creek.

Wildfowl, particularly heron, are attracted to estuarine environments and sandy beaches. Herons are common in these areas, yet the Pacific Flyway population is small. Shorebirds feed on the numerous snails, worms and insects of the estuaries and shorelands. Some species also nest in the near vicinity, under the protection of cover and trees. The river-creek mouth areas are also important for food and shelter to all wildfowl during climatic stress conditions such as prolonged cold periods, strong winds and severe storms. Marsh grasses usually border the shoreline areas of estuaries. Nutrients produced by these plants feed the food chain mechanisms and associated plant and animal communities in other types of habitat adjacent to river and creek mouths.

Open-Mud Bays

> *Open-mud bays without fresh water source (e.g., lower portions of Dyes Inlet and Liberty Bay) are characterized by an extensive intertidal zone, large mud flat areas and marsh grasses around the periphery. Sand and silt usually make up the bottom materials. Lack of fresh water ...* [limits] *use of these areas by juvenile salmonids as a transition zone between fresh and saltwater; however, they still provide rich feeding areas for juvenile salmonids. Shallow water provided by this type of habitat also provides refuge for young salmon from larger predatory fish. Other fish make extensive use of these areas for feeding and as a nursery area. Such fish include starry flounder, stickleback, eulachon, surf perch, sculpin, Pacific herring and various species of flounder and sole. At depths greater than one foot below mean lower low water, eel grass may occur, ...* [providing spawning conditions for Pacific herring and surf perch]. *Dungeness crab, oysters and oyster drills are found in Chico Bay.*

Salmon and cutthroat trout are found along the entire shoreline of Dyes Inlet. Smelt historically have spawned on the shoreline from Chico Bay to Silverdale. Littleneck and butter clams may be found at the head of Dyes Inlet, while bent-nose clams and other clams, shore crabs, barnacles, snails, tube worms and sand dollars are found in the general area.

> *Nutrients produced by the marsh grasses and algal communities of this habitat serve to sustain food chain mechanisms and associated communities in other types of habitat adjacent to these areas.*

Sand-Gravel-Cobble Beach

> *Sand-gravel-cobble beach are typical of most shorelines in Kitsap County. Most of the beaches in Puget Sound fall into this category. Marsh grass is usually not present or is found in very limited distribution in association with this type of habitat. Rockweed and sea lettuce are the types of vegetation usually found in the middle of low tide zones. Eel grass might be present at depths greater than one foot below mean lower low water. At about this depth, the bottom will usually be of a sandy type, with less rock ...* [except at protruding points of land]*. Anadromous fish utilize these shorelines as migrating areas, for feeding and as protection from predators. Cutthroat trout, salmon and rockfish can be found along the shoreline. Benthic examination off Point Herron revealed periwinkles, limpets, shore crabs and barnacles. Herring also spawn off Point Herron. Subtidal geoduck are found from Ilahee to University Point. At Ilahee, butter, littleneck and bent-nose clam, barnacle, shore and butter crab, tube worm, mussel and periwinkle have been found.*

Wildfowl also utilize this type of habitat. Use is usually dependent on the presence of some type of vegetation on the bottom interface, fish concentrations or presence of aquatic vegetation in areas where fresh water crosses the beach. Bars, spits and gravel beaches are favored by wintering black brant, which travel in great numbers along the Pacific Flyway.

Vertical Zones

Plant and animal life within the marine environment normally exhibit a vertical stratification representing three ecological niches. They are the benthic, water column and surface zones, which are distinct and yet interact with each other. The benthic zone includes the bottom sediments and the associated immediately overlying areas. The water column zone is that portion of the marine environment where the water column meets the benthic zone to two feet under the water surface. The surface zone is that portion of the water environment above the water column zone to six feet above the surface of the water body.

The Benthic Zone

The benthic community essentially covers all bottom-dwelling plants and animals. These include infauna living within the substrate, such as clams and worms, and epifauna utilizing the zone above the substrate, such as crabs, barnacles, mussels, limpets and snails.

> *Man places a direct value on some of the benthic organisms, such as clams, oysters, other edible molluscs and crustaceans. Others, while not seeming to be of value, are actually of great indirect importance through various food-chain and food-web relationships. Barnacles, which are abundant in the intertidal zone are often considered a nuisance, at worst, and of no importance at best. They are actually an important source of food for several species, including the pile perch. The bent nose clam, while it seldom attains a size large enough for people to feast on, is the victim of an interesting feeding relationship in which the English sole bites off the siphon of the clam if the fish finds it sticking up from the sand. Both the perch and the sole are food for man.*
>
> *Other seemingly unimportant benthic organisms, such as isopods, amphipods, polychaete and nemertean worms, should not be overlooked, as they too are part of intricate food-web relationships that may involve man.*
>
> *Many of the worms and crustaceans play an important role in the ecology of the benthic community by acting as scavengers, eating dead plants and animals on the bottom and helping to convert them back to nutrients for the algae.*

The numbers and types of benthic organisms that inhabit a particular area are dependent upon factors such as degree of slope, substrate composition, tide level, wave action and influences of man.

In the shallow portions of Dyes Inlet--less than 20 feet deep--are found Washington clam (*Saxidomonas gigantus*), manila clam (*Venerupis japonica*), cockles (*Clinocardium nuttalli*), lean dog whelk (*Nassarius mendicus*) and over 15 species of polychaete worms, of which the lumberinerids, ampharetids, orbiniids and trichobranchids are most common.

In the lower end of Sinclair Inlet—less than 30 feet deep--are Washington clam, the small clams *Axinopsis serricatus* and *Psepnidia lordi*, lumberinerid and cirratulid polychaetes and some unidentified cumaceans.

At the mouth of Rich Passage offshore of Manchester, in water depths greater than 60 feet, were found large concentrations of the small clam *Axinopsis serricatus* and some *Macoma carlottensis*. Polychaetes were generally scarce.

Benthic fishes in the general study area include spiny dogfish; bay goby; great, rough-back and Pacific sculpins; speckled sanddab; starry flounder; and flathead, rock, slender, English, C-O and sand

sole. A more complete listing of probably occurring fish species is given in Appendix D.

The Water Column Zone

Marine life in the water column zone is extremely complex and difficult to comprehend completely. It has been observed that many animals, including salmonids, rockfish, bottom fish, herring, oysters and shrimp, utilize the water body. These life forms each have a life cycle in which from birth to maturity there are strict requirements or limits within their migratory or territorial ranges for survival.

> ***The intertidal and the subtidal zones, where the process of photosynthesis is carried on, is important to the existence of these fish. The intertidal zone is visited by many fish, especially at nighttime, to feed on the collected waste, decomposed plant life, smaller shore life and other smaller fishes on the bottom. During the daytime, the larger fish retreat to safe deeper waters. Shallow bay and shoreline areas are necessary during the infant state of development for many fishes.***

Important local fish species in the water column include stickleback, eulachon, bay pipefish, pricklebacks, shiner and pile perch, striped and white seaperch, sturgeon and pygmy poacher. Fishes favoring algal and other vegetative associations include northern clingfish, plainfin midshipman, blackbelly eelpout, whitespotted greenling and longspine combfish. Other pelagic fishes include Pacific herring, salmon, Pacific cod, Pacific hake, walleye pollock and Pacific tomcod. A more complete list of probably occurring fish species is given in Appendix D.

The Surface Zone

> *The surface zone is used for navigation, water contact sports and visual and aesthetic appreciation; as a resting area for wildfowl; and for protection of small fish, predation by larger fish and swimming by mammals such as seals and otters.* [This zone is utilized by all life forms, including--indirectly--benthic life in the intertidal zone.] *Phytoplankton require high percentages of light transmission to carry on the photosynthesis process.*

Increased water turbidity or any activity which occupies the total surface zone hinders any other use of that zone and halts phytoplankton production. Since the surface zone consists of an interface of water element and air element, it is important to consider this zone as an *edge* environment which is affected by activity or development on either side.

Algal concentration studies for Sinclair and Dyes Inlet were performed in *Ecologic Modeling of Puget Sound and Adjacent Waters* (Reference 23). Although limited phytoplankton data were available for the calibration, the algal concentrations were studied for their value as an indicator of productivity in the marine environment and as an indicator of other factors, such as nutrients, light, certain growth coefficients and zooplankton. Computed algal biomass concentrations in Dyes and Sinclair Inlets are shown in Figure II-13. A species nonspecific algal biomass was computed, based on 80 mg biomass corresponding to one mg chlorophyll a.

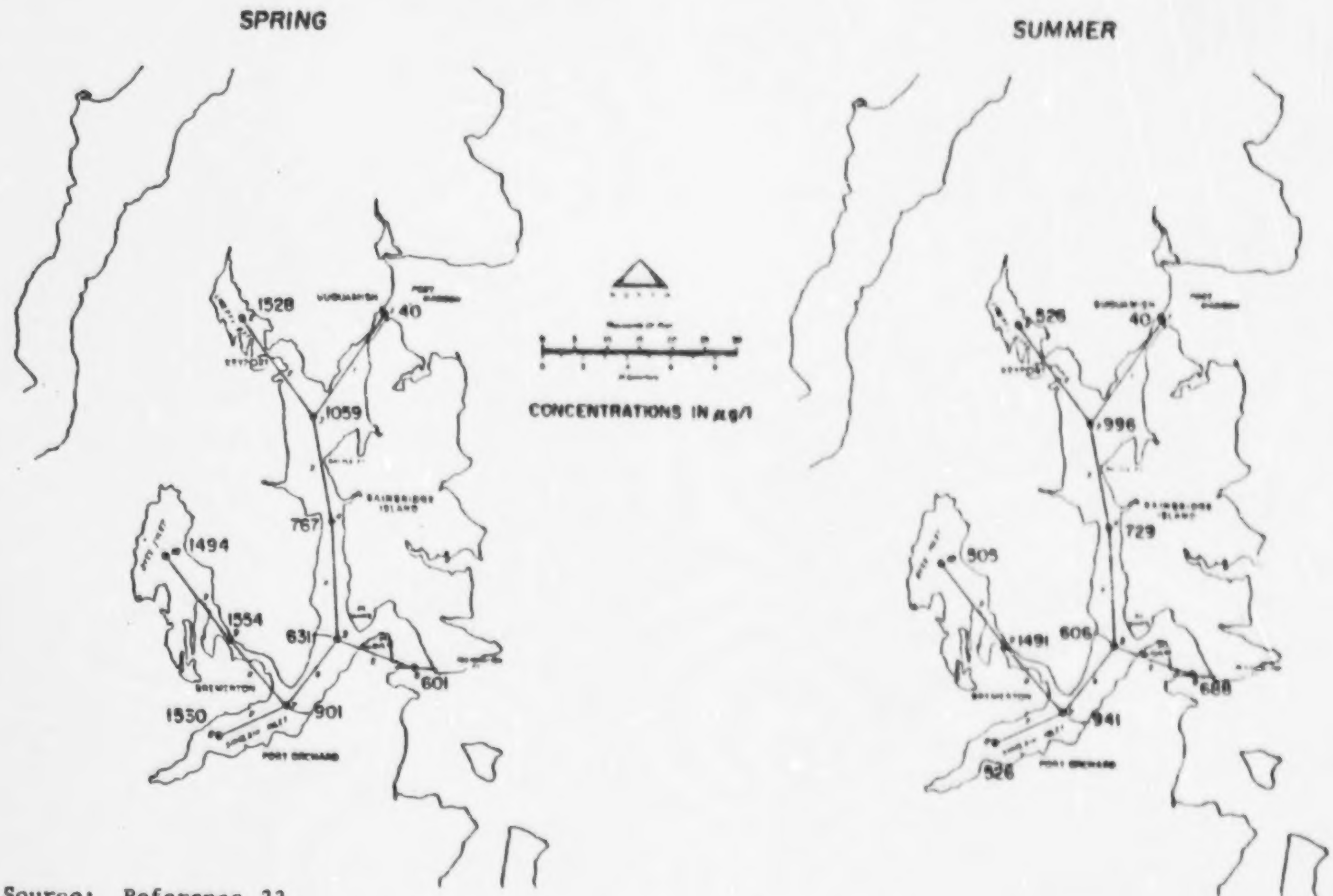
In winter, the model computed the lowest algal biomass with an average of 800 µg/l in Port Orchard. Spring values were higher, presumably due to increased light (heat) energy and upstream nutrient inputs. Concentrations exceeding 1,500 µg/l were computed for Sinclair Inlet, Port Washington Narrows, Dyes Inlet and Liberty Bay. Model results show that summer algal concentrations dropped to approximately 500 µg/l in the bays and inlets while remaining relatively high in Port Washington Narrows and near Bremerton. By contrast, the main channel of Puget Sound, near Bainbridge Island, ranges from 5 µg/l in the winter to 348 µg/l in the spring. Model results can only approximate true conditions, which could vary from those predicted.

The seasonal pattern of variation in algal concentration tends to infer that phytoplankton in Puget Sound are primarily limited by light and secondarily by the input of nutrients. Continuously high concentrations from spring to summer in Port Washington Narrows reflects the nutrient loading from the Mannette Sewage Treatment Plant wastewater outfall on the western shore of East Bremerton and the return of much of that wastewater at each tidal cycle.

Wastewater Outfall Disposal Site

A summary presentation of the prominent features at the proposed marine outfall disposal site is given in Table II-15. The table indicates the general presence of shellfish and vegetation species in addition to fishing and other activities in the local area.

In July and August 1975 the intertidal marine environment of three of the potential wastewater outfall sites was assessed in detail by Northwest Environmental Consultants. The sites studies were (1) Site B, Point Monroe; (2) Site C, north Port Orchard; and (3) Site F, Dyes Inlet at Silverdale. These additional findings were briefly summarized


SPRING
SUMMER
1528
40
1059
767
1494
1554
631
601
1530
901
526
40
996
729
505
1491
606
688
941
526
SUQUAMISH
PORT MADISON
BAINBRIDGE ISLAND
BREMERTON
PORT ORCHARD
CONCENTRATIONS IN μg/l

Source: Reference 23.

Figure II-13. Computed algal biomass concentrations in Dyes and Sinclair Inlets

Table II-15. **MAJOR MARINE FAUNA AND USAGES IN THE VICINITY OF PROPOSED WASTEWATER DISCHARGE SITE**

Marine environment summary	Site C, north of Brownsville
Mussels	x
Barnacles	x
Cockles	a
Manila clam	a
Gaper clam	a
Bentnose clam	x
Butter clam	x
Japanese oyster	a
Pacific oyster	a
Oyster drill infestations	a
Geoduck (subtidal)	a
Littleneck clam (subtidal)	x
Intertidal hardshell clam	a
Mixed shellfish	a
Herring spawning areas	x
Surf smelt spawning areas	a
Major waterfowl areas	a
Eelgrass beds	a
Sea lettuce (*ulva*) and *Laminaria*	a
General fishing area (sport salmon)	x
Concentrated fishing area (sport salmon)	a
Commercial salmon fishing (gill net)	a
Nonsalmon sports fishing	
Cutthroat	a
Bottom fish	a
Commercial otter trawl	
Regularly fished	a
Historically fished	a
Closed to trawl	x
Commercial herring fishing	x
College of Fisheries research areas	x
State tidelands	a
Aquatic land use allocations	
Bedlands: aquaculture	a
commercial	a
Tidelands: commercial	a
Presence of existing outfalls	a

Source: Reference 22.

Note: "a" indicates absent or insignificant; "x" indicates present.

in the draft EIS. For detailed descriptions, refer to the baseline study (Reference 62). Following is a description of the results for the proposed site at north Port Orchard. Sampling sites are identified in Figure II-14.

Site C, North Port Orchard

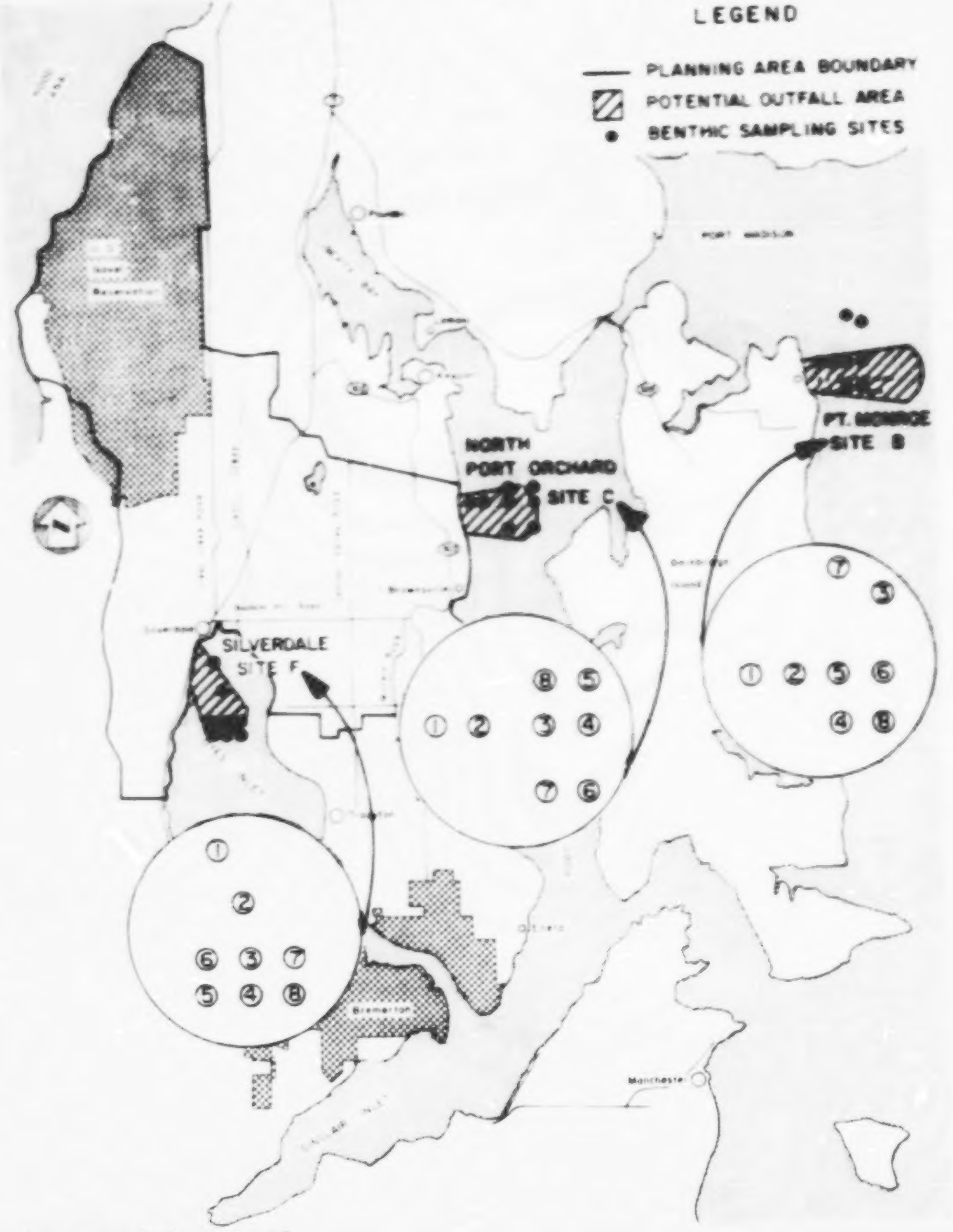
The proposed site has an intertidal beach beginning at the base of a steep, 200-foot eroding cliff area. The first 30 feet is composed of large cobbles, boulders covered with periwinkles and barnacles, drifting logs and many fallen trees. From 30 to 60 feet, the beach becomes silty sand with pebbles and cobbles and is populated by periwinkles, limpets, purple shore crabs and native and Japanese littleneck clams. From 60 to 90 feet, the beach flattens out to dark gray sandy silt, covered heavily with green algae (*Enteromorpha*) and inhabited by the bent-nosed clam and the parchment tube worm. Beyond 190 feet, the sandy silt is thickly vegetated with eelgrass and supports several clam species, cockles and polychaete worms of the family Owenidae. Below the intertidal zone, aquatic vegetation diminishes, and burrowing animals, particularly geoduck clams, brittle stars (*Amphiodra occidentalis*), the tube worm *Phyllochaetopterus prolifica*, and the nut clam *Acila castrensis* are abundant. Beach seining during the summer of 1975 netted predominantly shiner seaperch, staghorn sculpin and jellyfish.

BIOLOGICAL RESOURCES

Flora Resources

The planning area is situated within a broad evergreen belt characterized by dense growths of primary and secondary coniferous forests. Approximately 290,000 acres or 60 to 65 percent of Kitsap County is commercial forest land. The major commercial species is the Douglas-fir. Commercial tree-harvesting occurs in limited portions of the planning area but does not constitute a major industry. The production of and floral products such as Christmas trees, holly and foliage plants (brush and ferns) comprises a minor industry in Kitsap County.

Agricultural production is limited to home fruit and vegetable gardens, small-scale farms and forage for grazing livestock. The 1969 U.S. Census of Agriculture reported consolidation and decreasing numbers for farmsteads, as shown in Table II-16.


LEGEND
PLANNING AREA BOUNDARY
POTENTIAL OUTFALL AREA
BENTHIC SAMPLING SITES
PORT MADISON
NORTH
PORT ORCHARD
SITE C
PT. MONROE
SITE B
SILVERDALE
SITE F
Bremerton
Manchester
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Source: Reference 62

Figure II-14. Phase II benthic sampling sites

Table II-16. CENSUS OF AGRICULTURE, KITSAP COUNTY

Land use	Total number		Total acreage		Percent of county	
	1964	1969	1964	1969	1964	1969
Farms	845	260	50,907	24,461	19.7	9.7
Woodland, including woodland pasture farms	607	159	35,467	16,071	-	-

Source: Reference 24.

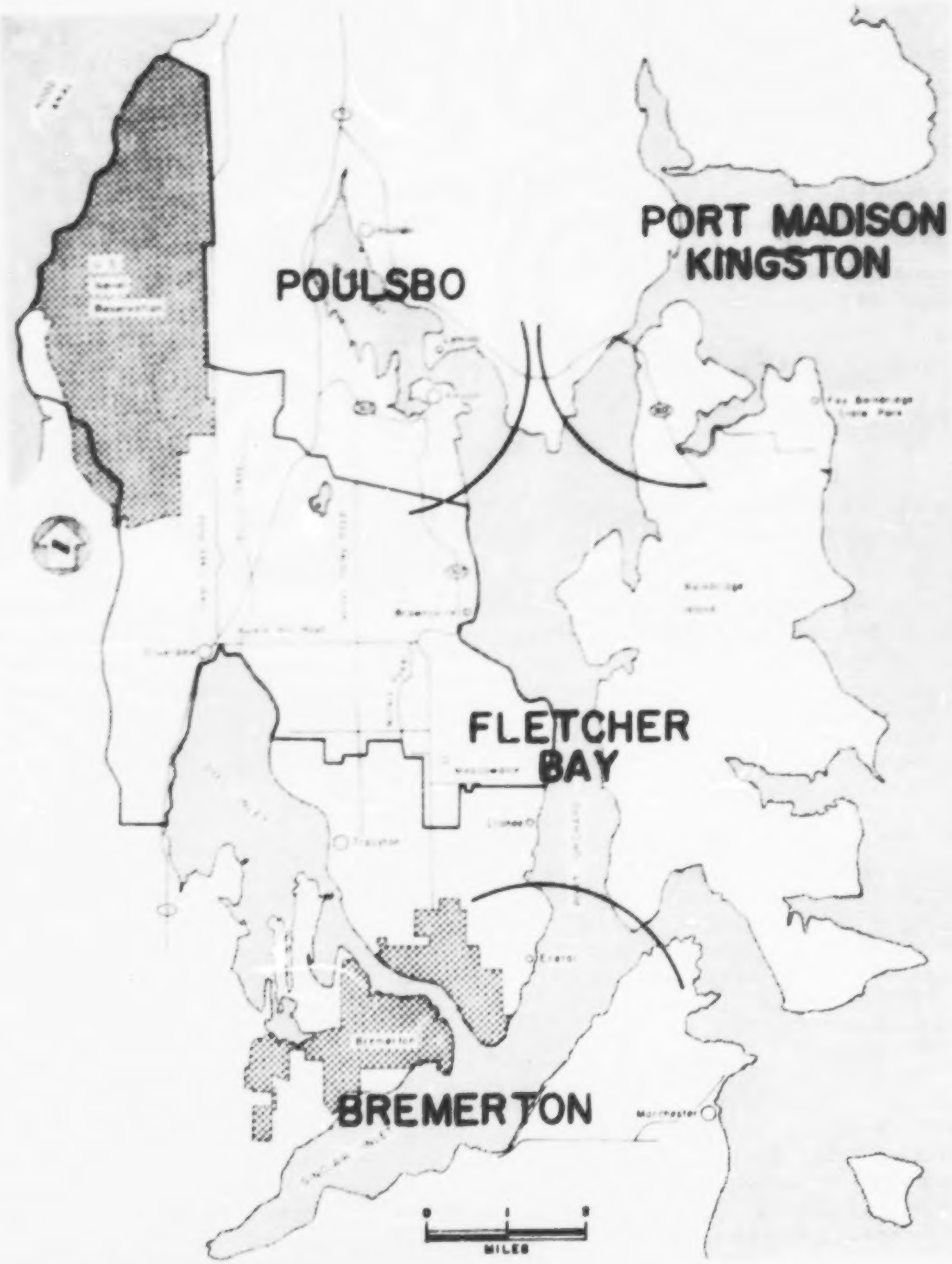
Fauna Resources

Fisheries and Aquaculture

There are three major salmonid-producing streams in the planning area which, although small in size, support runs of coho and chub salmon and steelhead trout. They are Clear Creek at the head of Dyes Inlet, Barker Creek on Dyes Inlet and Steel Creek, which enters Port Orchard at Burke Bay. The shoreline areas of Kitsap County are also important for the overall salmon production of much of Puget Sound. Juvenile salmon migrating to the ocean remain close to shore for protection and food.

Puget Sound also produces major groundfish resources, including several flatfish, rockfish, herring, smelt and other species. Some of the species present are dependent on shallow shoreline reaches for spawning and/or nursery areas. The commercial and sport harvest of shellfish in the area is relatively intense, with emphasis on oysters, hardshell clams, crabs and shrimp. Significant commercial production of Pacific oysters occurs in the Poulsbo area in Liberty Bay and in lower Dyes Inlet near Silverdale.

Commercial fishing statistical areas for central Kitsap County are shown on Figure II-15. The three-year average commercial poundage and dollar value of marine landings within these statistical areas are given in Table II-17. The statistics reflect commercially valuable and harvestable species but do not necessarily reflect all resident species, ecological effects, productivity or Fisheries Department harvest restrictions. Salmon were not included in individual port catch statistics because they were categorized as a wide-ranging species not specific to particular areas.


PORT MADISON
KINGSTON
POULSBO
FLETCHER
BAY
BREMERTON
Bremerton
Manchester
0
1
2
MILES

Source: Reference 1.

Figure II-15. Commercial fishing statistical areas

Table II-17. AVERAGE MARINE LANDINGS AND VALUE WITHIN THE PLANNING AREA, 1972-1974

Species	Kingston and Port Madison (lb)	Kingston and Port Madison ($)	Fletcher Bay (lb)	Fletcher Bay ($)	Bremerton (lb)	Bremerton ($)	Poulsbo (lb)	Poulsbo ($)
Pelagic fish								
Herring	3,353	671	21,751	4,350	33,910	6,782	2,949	590
Silver smelt			72	14	232	46	406	81
Dover sole	3,371	336						
English sole	18,066	2,171					165	20
Rock sole	2,081	240						
Sand sole	1,166	188						
Flounder	9,161	713						
Ling cod	71	16	24	6				
True cod	14,574	1,457	4	-				
Rockfish	1,926	202			69	7		
Blue perch	561	44	457	36	7,231	570	661	52
Silver perch	873	135			313	48		
White perch	3,953	778	2,106	415	22,259	4,383	1,355	267
Skate	350	10						
Pelagic total	59,506	6,961	24,414	4,828	64,014	11,829	5,536	1,010
Benthic species								
Butter clam	6	1	132,987	12,218	519	47	45	4
Horse clam			21,187	1,065				
Littleneck clam	4,517	1,084	74,355	17,845	20,878	5,011	8,986	2,157
Pacific hard clam	285	42	570	84	1,000	148	197	29
Pacific oysters							113,576	130,612
Octopus	545	112					67	14
Crab	5,145	2,857						
Sea cucumber	1,200	300	2,148	537	2,148	537		
Geoduck			425,694	41,871				
Benthic total	11,698	4,396	658,941	73,530	24,545	5,757	122,871	150,388
TOTAL	71,204	11,357	683,355	78,358	88,559	17,586	128,407	151,398

Source: Reference 22.

The Kingston and Port Madison areas produced over 33,000 pounds of groundfish, of which English sole and cod species were most important. Overall economic yield was the lowest (4.4 percent) compared to the other areas.

The Bremerton area, including Dyes Inlet, yielded the second lowest economic marine harvests (6.8 percent). Predominant catch items included herring, white and blue perch and littleneck clams.

The Fletcher Bay area includes Fletcher Bay on Bainbridge Island and the main portion of the Port Orchard channel. The main fish catch is herring; however, the majority of the local income is derived from geoduck clams, with some contribution by butter and littleneck clams. The Fletcher Bay area accounts for approximately 30.3 percent of total planning area marine catch income. Geoduck harvests alone account for 53 percent of the income.

The Poulsbo statistical area includes Liberty Bay and the connecting channel from the bay to Port Orchard. Although the area is small, the Poulsbo region accounts for 58.5 percent of the local income. The major economic species is the Pacific oyster, which comprises almost 87 percent of the fishing income. Supplemental marine resources include littleneck clams and herring.

Terrestrial Fauna

The primary livestock activities in the general area are dairy farming and the raising of poultry; some beef and swine farming also take place in the region. However, the largest concentration of livestock is found on McNeil Island, well to the south of the planning area.

Game species within the planning area are generally associated with particular habitats. Mammals generally prefer densely wooded areas with intermittent openings and running water. These include bear, deer, bobcat, coyote and rabbit. Black bear numbers have been estimated at 300 to 500 within Kitsap County (Reference 25). Although major bear populations usually occur in the southern and western portions of the county, small populations are found near Island Lake and in scattered areas. Deer range through the semi-open areas but are not in great abundance. Bobcat and coyote counts are not available, but these species are considered numerous in rural, farm and wooded areas. Rabbits, on the other hand, are found in all meadow and brush areas, with a cyclical abundance from year to year. Gamefowl occur in limited areas and include blue grouse, ruffed grouse, mountain quail, ring-necked pheasant and California quail. The most conspicuous and probably most abundant animal is the raccoon. These are plentiful along the shorelines of lakes and streams and near agricultural areas.

The only lake within the planning area is Island Lake, which contains populations of rainbow trout. The Department of Fish and Game stocks the lake with preseason legal and mid-May fingerling trout.

WATER RESOURCES

The planning area is located within several miles of marine and estuarine water on all sides. To the west is Hood Canal, a long, narrow and deep salt water body; to the northeast, east and south is the Port Orchard system. The latter, characterized as shallow, is directly connected to Puget Sound proper via Rich Passage and Agate Pass. A number of streams are found in the planning area, among them Clear Creek, Steele Creek, Barker Creek, Strawberry Creek and Knapp Creek. Island

Lake, with an area of about 42.7 acres, is the only lake located in the area. Surface waters are used primarily for domestic, agricultural and recreational purposes and by migrating fish. Most of the area is underlain by Vashon Drift till, which normally is impermeable and yields little groundwater. However, deeper strata, including the Colvos sands and the salmon and pre-salmon spring deposits, yield moderate to large quantities of water. The major local groundwater supplies are located in Silverdale, Meadowdale, Bangor Base and Gilbertson (Reference 1). If planned improvements are implemented, including the tapping of additional aquifers, adequate domestic water supplies will be available to meet the projected needs resulting from the development of the Trident Support Site (Reference 3).

RECREATIONAL RESOURCES

Kitsap County has been a popular area for second homes and and attractive site for vacationers. Its scenic beauty as well as the area's recreational resources--particularly water-based recreation--are among the reasons for its appeal.

Although it is currently deficient in recreational land, Kitsap County offers a number of recreational opportunities. However, no recreational lands were designated as winter sports areas, wildlife habitat areas, wetland areas, outstanding natural areas, or wilderness areas (Reference 25).

For Central Kitsap County, in which most of the planning area falls, the recreational areas available in 1974, along with the corresponding demand for 1973, are shown in Table II-18 (Reference 25). The standards for determining the number of acres required per 1,000 population for each area are also presented.

The activities which are common in the aforementioned recreational areas include field sports such as soccer, baseball and football; court sports such as handball, tennis, volleyball and basketball; water sports such as boating, water skiing and swimming; and other miscellaneous activities such as horseshoes, shuffleboard, etc. Other recreational activities which are pursued by the public include hunting and camping.

The County, recognizing that the existing 837 acres of developed recreational land are inadequate to meet current and future needs, has made a number of recommendations and planning policies. The reader is referred to the proposed "Kitsap County Park and Recreation System Plan" by ORB for further details.

Table II-18. CENTRAL KITSAP COUNTY RECREATIONAL RESOURCES

Area type	Standard number acres per 1,000 population	1973 demand	1974 supply
		(acres)	
Small urban park			
Neighborhood	2.5	141.3	14.8
Community	2.5	157.0	28.5
Large urban park			
Without shoreline	1.5	154.7	218.8
With freshwater shoreline	1.5	154.7	125.9
With saltwater shoreline	2.0	206.2	93.1
Special-purpose			
Golf course	1.0 [a]	103.1	81.0
Nonurban trail			
Bicycle path	.6 [b]	61.9	275.0
Nature walk	.9 [b]	92.8	-
Equestrian trail	.3 [b]	34.2	-
			837.1

[a] Number holes/1,000 population.

[b] Number miles/1,000 population.

Source: Reference 25.

UTILITY SERVICE SYSTEMS

The utility service systems which are currently available in Kitsap County are gas, electricity, water and telephone. The gas, electricity and telephone systems are privately owned, while a number of municipalities, water districts and private systems provide water service.

Telephone service to the U.S. Naval reservation at Bangor and to Poulsbo, Keyport and Lemolo is provided by the United Telephone Company. Most of the rest of the planning area is served by the Pacific Northwest Bell System, which is presently making improvements in the area, including extending switching capabilities, increasing the number of lines and extending service to areas requesting it, according to the system's Commercial Forecasting Office.

Electricity for the planning area, excluding the navel base but including Poulsbo, is provided by the Puget Sound Power and Light Company, the western division of the Bonneville Power Administration. The Puget Sound Power and Light Company indicates that there are no problems in handling the electrical requirements of the planning area and anticipates that it will be able to adequately handle any future increases in demand.

The Cascade Natural Gas Company has been providing natural gas to Kitsap County in the Bremerton and Port Orchard areas, which are outside the planning area. The company states that its natural gas supply is sufficient to provide service to the planning area but that there has been the economic problem of making the gas available to the area, given the low present population density and the nature of the terrain (Reference 26). At present, natural gas service does not extend as far north as Poulsbo; however, it could be provided by Cascade Natural Gas Company if demand reached a level high enough to justify system installation cost.

The planning area has a number of water systems in operation. The publicly owned Silverdale Water District serves a population of approximately 2,100, with meters installed only for schools and commercial customers and the remainder being served by local wells (Reference 1). Privately owned water systems in Kitsap County include nonprofit corporations. The State Department of Health regards all water systems serving two or more families as public, regardless of ownership. These must comply with public health requirements. Most of the water for the planning area is supplied by wells.

The major sources of groundwater in the planning area are shown in the following table.

Table II-19. MAJOR WATER SUPPLY WELLS

Location	Well designation	Yield	Capacity
		(gpm)	
Silverdale	25/1E-16J	25	250
	-21B	22	100
	-28R	25	150
Meadowdale	25/1E-25M	50	450
Bangor Base	25/1E-60	35	100
	-32K	350	1,500
	-32L	30	300
	-32M	550	550
Gilbertson	25/1E-24H	250	1,500+

Source: Reference 1.

Table II-20 shows the extent of existing waste collection and treatment systems in the study area.

The wastewater collection and treatment systems outside the study area but recommended for inclusion with the regional facility serve Poulsbo, Keyport and Lemolo and are also described in Table II-20. As the table indicates, Lemolo is sparsely populated and has no treatment plant. Poulsbo has a wastewater treatment plant which provides only primary treatment and is at two-thirds capacity. Plans to expand and upgrade the system, including as a serious possibility the link-up with the proposed system in central Kitsap County, are under consideration at this time (References 61 and 66). Keyport has a secondary level plant with ample remaining capacity but has been cited in the media as a source of pollutants to Liberty Bay.

JURISDICTIONS

Kitsap County's governmental responsibilities are defined by the State. Three elected County Commissioners oversee administrative and legislative activities. Other elected officials include sheriff, assessor, auditor, treasurer, clerk, judges, prosecuting attorney and coroner. In addition there are 12 primary appointed County officials. There are 11 districts in the county, including school, water, fire, port and sewer districts, each with its own taxing authority. County agencies such as the departments of planning, budgets and personnel, human resources, public works, engineering, etc. handle planning and development for the county. The county has four municipal governments: Bremerton, Port Orchard, Poulsbo and Winslow, all located outside the planning area.

There are a number of Federal, State and regional agencies which administer programs to the county. Three important regional agencies which exercise planning policies in the county include the Puget Sound Governmental Conference, the Central Puget Sound Economic Development District and the Puget Sound Health Planning Council. The Health Planning Council and the Economic Development District do not directly affect the selection of a facility alternative. The Puget Sound Governmental Conference acts in an advisory capacity in the selection process (Reference 60). Responsibility for alternative selection lies with Kitsap County and the funding agencies.

PUBLIC AND SOCIAL SERVICES

Public and social services are provided in Kitsap County be a number of different agencies. The Kitsap Community Action Program made a

Table II-20. EXISTING WASTE COLLECTION AND TREATMENT SYSTEMS

Service area	Type of system	Existing residences	Proposed residences	Existing flow, mgd	Capacity, mgd
Parkwood	Interim	259 sf 1 school	460 1 school	0.07	
Firglade	Interim	70 sf	73	0.024	
Kariotis					
North	Interim	37 sf	204		
Mobile Home Park	Interim	48 mh			
Quad 2	Interim	104 mf 1 golf 61 sf			
Woodridge	Interim	25 sf	31	0.009	
Eldorado Park	Septic tank	10 sf		0.004	
Eldorado Hills					
Division 1	Septic tank	61 sf			
Division 2	Interim	34 sf			
Division 3	Septic tank	53 sf			
Highland Park	Dry sewers	11 sf	16	0.004	
Bridleview	Dry sewers	16 sf		0.006	
Adkins Trailer Park	Dry sewers	--	66		
Bali Hai	Dry sewers	--	66		
Woodmere	Dry sewers	--	98		
Evergreen East	Dry sewers	--	10		
Bridle Ridge West	Dry sewers	--	20 sewered to Parkwood East 50 septic tank		
Silverdale	Primary plant	407		0.17	0.23
Poulsbo	Primary plant	700 sf 100 mf		.40	.60
Keyport					
Civilian	Secondary plant	105 sf		.02	.06
Navy	Secondary plant	industrial area serving population equivalent of 1,400.		.08	.14
Lemolo	Individual septic tanks	80 sf	75 mf	.02	--

Source: References 1, 60, 63, 64 and 65.
Notes: sf = single family; mh - mobile home; mf = multi-family; interim = collective septic tank treatment; dry sewers = individual septic tank treatment with unconnected neighborhood sewers.

"Human Resources Survey" in May 1973 and found that 415 agencies provide mainly "social" services to county residents. These agencies were classified as follows: 10.1 percent, public; 63.2 percent, private volunteer agencies with human resource services as their primary goal; 27.5 percent, private agencies which have services as a secondary function and exist primarily for other purposes, such as fellowship. Approximately 28 percent of these agencies are out-of-county agencies which provide services to Kitsap County. The largest cateogries, by agency function, are represented by recreation and fraternal agencies (17.1 percent), general and child welfare agencies (16.1 percent) and educational and religious agencies (12.5 percent). The State Department of Social and Health Services provides county residents with such programs as public assistance, vocational rehabilitation and veterans' assistance.

Health services in the county are limited. There are two hospitals in Bremerton, which is located outside the planning area. One of these hospitals, the Puget Sound Naval Shipyard Hospital, exclusively serves the military segment of Kitsap County, including military dependents. The other hospital, Harrison Memorial, is available to the civilian population. The Bremerton-Kitsap County Health Department provides a variety of personal and environmental health services and handles a near-maximum workload. Emergency response services include commercial and community ambulances, fire departments and volunteer servcies, but there is no integrated dispatch or communications system for the different ambulance jurisdictions.

The Kitsap Comprehensive Health Planning Council has been trying to develop a county health plan which would make health care services more accessible and available to county residents living outside the Bremerton area. The council states, "The development to meet the emergency medical needs of Kitsap residents has been uncoordinated, unintegrated, and uneven in quality and quantity" (Reference 3).

Dentists and physicians are concentrated in the urban centers of the county. About 80 percent of the county's physicians are located in the Bremerton area. The Bremerton Program Planning and Grant Administration indicated that in 1973 there were 54 available full- and part-time primary-care physicians and 47 dentists per 100,000 people compared to the state average of 82 and 60 per 100,000 people, respectively. They also stated that there were eight medical clinics, 55 pharmacists and 256 nurses in the county.

Law enforcement in the county is provided by the State, the County and the municipalities within the county. There were 141 officers serving the county in 1974. The International Association of Chiefs of Police require that there be at least one commissioned law officer for every 1,000 people. The police force currently complies with this requirement but will have to expand as population growth occurs in the county.

Fire protection is provided mainly by volunteer fire departments. Three fire stations and one sub-station are located in or immediately adjacent to the planning area. The "Central Kitsap Study Area Comprehensive Plan" (Reference 27) calls for two more sub-stations in the planning area.

Public educational facilities for the planning area include three elementary schools, one junior high school and one high school. In October 1974, 4,415 students were enrolled in these schools. There are two private parochial schools in the county, one in Bremerton and one in the Central Kitsap School District. Facilities for higher education are provided by the Olympic Junior College, located in Bremerton. It is the seventh largest of the 22 community colleges in Washington.

Construction to expand educational facilities of the Central Kitsap School District No. 401 has already been funded by local voters, with the following estimated completion times (Reference 28):

1 Elementary School	- Foster Road area	September 1976
1 Elementary School	- Esquire Hills area	September 1976
1 Elementary School	- Bangor (South Gate area)	September 1977
1 Elementary School	- between Silverdale and South Bangor	September 1977
1 Elementary School	- Eldorado Hills area	September 1979
1 High School	- south of fairgrounds	September 1979
1 Elementary School	- east side of district	September 1980

The sewage treatment facilities in the planning area are administered by the Kitsap County Department of Public Works. The wastewater treatment plant at Keyport is within the Kitsap County Sewerage District No. 4, administered by three district commissioners. The Poulsbo treatment plant is under the direction of the city engineer. A regional facility to serve a number of communities in the planning area would be administered by the Kitsap County Department of Public Works (Reference 67).

TRANSPORTATION

As of 1983, assuming the existence of Trident, the Kitsap County transportation network will be severely overloaded.

Traffic impacts are determined by using volume/capacity ratios. Any road has a certain calculated capacity, which is determined by the number of lanes, topography and speed limit. The volume/capacity ratio is calculated by dividing the observed or (for future conditions) estimated traffic volume by the calculated capacity. When the ratio is below 1.0, traffic is stable and moves at satisfactory speeds. As the volume approaches capacity (when the ratio is close to 1.0), freedom of movement and speed become restricted. At ratios above 1.0, traffic movement is impeded and traffic is severely congested.

Table II-21 shows 20 selected segments of the Kitsap County transportation system as of 1973 (before Trident). Table II-22 shows the impact on these 20 segments that will result from Trident and from the expected general Kitsap County growth rate.

Kitsap County is located on a peninsula; access to the region is chiefly by bridge or ferry, with the only land access over an isthmus to the southwest. As shown in Table II-23, the average daily number of passenger trips in and out of the county is 16,233. The ferry service cannot transport more vehicles during peak hours with its present equipment; because of costs, no new equipment is likely to be purchased.

It should be noted that most of the ferry traffic is composed of commuters who live in Kitsap County and work in Seattle. As the Trident-generated population will live and work in Kitsap County, its presence will not affect peak ferry traffic although it will affect off-peak traffic.

The six-year road construction program for Kitsap County includes two small segments which overlap parts of proposed pipeline routes. One section, to be repaired, is about one-third mile long and is located on Luoto Road in the northern part of the planning area, just west of Highway 3. The second segment is a one-tenth mile segment of Bucklin Hill Road in Silverdale, at Kitsap Way. Minor repairs to traffic facilities will be made along this small section. At this time it cannot be predicted when the roadwork will be undertaken. The work on Luoto Road will probably not begin for several years because of present unavailability of Federal funding. In order to minimize the disruption and expense involved in road improvements and in utilities excavations, all utilities projects are coordinated by the Utilities Coordinating Council in Kitsap County (Reference 68).

KITSAP COUNTY BUDGET

The amount of revenue necessary to operate county services per fiscal year is determined by the projected budgets and expenses of the various county service agencies and departments. Table II-24 shows a breakdown of the 1975 Kitsap County budget (Reference 29). The budget for the county has fluctuated between $14 and $17 million for the last four years. However, with an influx of population and the relative increase in demand for public services, the budget is expected to rise sharply.

The general obligation (GO) bond approach is the method most widely used by public entities to finance improvements which are considered

Table II-21. EXISTING TRAFFIC CHARACTERISTICS, SELECTED STATE AND COUNTY ROUTES, KITSAP COUNTY, WASHINGTON, 1973

Segment number and description	Average peak-hr volume	Capacity	Volume/ capacity ratio
1. SR 305, Winslow to Day Rd.	390	1200	0.32
2. SR 305, Day Rd. to Agate Pass Br.	350	1200	0.29
3. SR 305, Poulsbo to Bond Rd.	-	1200	-
4. Connection, SR 305 & SR 3, Bond Rd. to Finn Hill Rd.	-	1200	-
5. SR 3, Finn Hill Rd. to Sherman Hill Rd.	650	1000	0.65
6. SR 3, Sherman Hill Rd. to Luoto Rd.	643	1000	0.54
7. Luoto Road	-	1100	-
8. SR 3, Luoto Rd. to SR 3 Fwy.	655	1200	0.55
9. Clear Creek Rd., Base to SR 3 Fwy.	206	1100	0.19
10. Clear Creek Rd., SR 3 Fwy., to Silverdale	210	1100	0.19
11. Bucklin Hill Rd., Silverdale to Tracyton Blvd.	-	1100	-
12. Bucklin Hill Rd., Tracyton Blvd. to SR 303	352	1100	0.32
13. SR 303, McWilliams Rd. to North Bremerton	547	1400	0.33
14. SR 3 Fwy., Clear Creek Rd. to Newberry Hill Rd. Interchange	-	1660	-
15. SR 3 Fwy., Newberry Hill IC to Chico IC	858	3300	0.26
16. SR 3 Fwy., Chico IC to Oyster Bay IC	605	3300	0.18
17. SR 3 Fwy., Oyster Bay IC to Werner Ave. IC, West Bremerton	-	1660	-
18. SR 3, End of Fwy. to Gorst Junction	1551	1910	0.81
19. SR 16, Gorst to Junction with SR 160	1720	1910	0.90
20. SR 160 from Junction SR 16 to Port Orchard	787	1100	0.71

Source: Reference 3

Note: Congestion within Bremerton not specifically analyzed.

Table II-22. ESTIMATED 1980 VOLUME/CAPACITY RATIOS, SELECTED STATE AND COUNTY ROADS, KITSAP COUNTY, WASHINGTON

Segment numbers [b]	Volume/Capacity ratios [a] Without Trident	With Trident Option 1 [c]	Option 2 [d]
1	1.01	1.18	1.13
2	0.68	0.89	0.81
3	1.41	2.28	1.88
4	1.00	1.94	1.53
5	1.24	2.36	1.87
6	1.06	2.23	1.67
7	0.13	1.24	0.59
8	1.01	1.31	1.31
9	0.28	3.28	0.98
10	0.23	1.38	0.54
11	0.49	1.22	0.60
12	0.37	1.02	0.49
13	0.75	1.30	0.98
14	0.52	1.91	0.95
15	0.38	1.06	0.61
16	0.35	1.00	0.58
17	0.52	1.14	0.83
18	0.94	1.32	1.17
19	0.95	1.27	1.14
20	0.88	1.22	1.04

[a] Volume/capacity ratios calculated using estimated 1980 peak hour traffic volume and 1973 capacity at level of Service "C".

[b] See table for segment location.

[c] Assumes all military family housing off-base.

[d] Assumes all military family housing on-base.

Source: Reference 3

Table II-23. ACCESS TO KITSAP COUNTY, MAY 1973 [a]

Route	Passengers per month
Hood Canal Bridge	125,000
Winslow-Seattle Ferry	180,000
Bremerton-Seattle Ferry	110,000
Edmonds-Kingston	72,000
	487,000 [b]

[a] Average volume month; volume tends to increase during summer and decrease during winter.

[b] On a daily basis, the average is 16,233 passengers.

Source: Reference 3.

Table II-24. 1975 KITSAP COUNTY BUDGET

Budgeting entity	Tax dollars budgeted	Percent of revenue
County	2,139,516.47	13.06
Road district	1,595,554.16	9.74
Municipalities	1,233,642.66	7.53
School districts	9,525,754.13	58.13
Fire districts	711,599.33	4.35
Library districts	347,476.24	2.12
Island recreation district	100,888.93	.62
Public utilities district	158,170.27	.97
Hospital district	66,034.94	.40
Port districts	505,547.88	3.08
TOTAL	16,384,185.01	100.00

to be of general benefit to a region as a whole. They are primarily secured by and payable from ad valorem taxes levied on all taxable properties within the jurisdiction of the issuing entity. General obligation bonds represent the highest type of credit that a public entity can issue; as a result, they can normally be sold at lower interest rates than can other types of bonds. The lower interest rates stem from the fact that the GO bonds are backed by the public agency's total assets, and the interest payments are not subject to Federal income tax. Such bonds represent an equitable system for financing works of benefit to the entire area of the agency; when employed with deferred redemption schedules, the costs of the improvement may be paid by future populations receiving the benefit of that improvement so that per capita cost is held fairly constant over the life of the issue.

General obligation bonds must be approved by a two-thirds vote of the electorate and are limited to a reasonable percentage of the assessed valuation. Under emergency or urgent circumstances, special legislation may permit the issuance of general obligation bonds. Features of general obligation bonds can be summarized as follows: (1) lower interest, (2) lower annual cost to meet principal and interest payments compared with other types of bonds and (3) greater flexibility in raising funds.

The revenue bond is another method which may be used by an entity to finance major facilities when an adequate method of levying and collecting service charges to secure payment of the bonds can be developed. Differing from general obligation bonds, payment of revenue bonds is secured solely by the revenues derived from, or as a result of, the improvement constructed with bond proceeds; no property taxes may be levied for their payment. This type of bond is becoming increasingly popular in California and elsewhere in the United States because of increasing difficulties faced by many communities and public agencies attempting to finance an increasing number of services within their general obligation bonding capacity.

Major advantages of revenue bonds can be summarized as follows: (1) there is no legal limit on the amount of such bonds, (2) revenue bonds are payable solely from the revenues of the project and can never become a lien or charge against real property, and (3) payment of the bonds is derived solely from users of the facilities of the project for which the bonds were issued.

The disadvantages of such bonds can be summarized as follows: (1) management of the funds is relatively inflexible; (2) the interest rate is usually higher than that for general obligation bonds; (3) owners of property now using the service pay nothing toward the bonds, even though some indirect benefit may be received by such owners from the project financed by such bonds; and (4) a reserve fund must be maintained as additional security for bond payment and may be in excess of expected requirements by 30 to 50 percent.

LAND AND PROPERTY VALUE

Property values in Kitsap County have been rising for the past nine years at an increasing rate, particularly in recent years. The County Assessor's office indicates $980,833,997 total valuation of taxable property for the 1975 Tax Rolls. The county assesses land and personal property in terms of existing market value plus improvements made to land and personal property during the fiscal year (Reference 29). Table II-25 describes the breakdown of taxable property.

Table II-25. THE 1974-75 TAX ROLLS ASSESSMENT

Type of property	Assessment, $
Land	
Acreage	336,391,047
Improvements	318,092,922
City and town lands improvements	84,419,958
Personal property	
Boats	5,279,340
All other	51,077,642
TOTAL	980,833,997

For the next few years, the increase in land value and personal property is expected to continue due to the influx of population induced by Trident. A significant increase in assessed value will result from improvements made to the land for residential and commercial developments and the increase in taxable personal property. This expected increase, though it has just begun, is here considered to be part of the baseline context (environmental setting) of the area.

LABOR FORCE

The economy of Kitsap County is dominated by the Federal defense industry. Civilian employment in 1972 at the Puget Sound Naval Shipyard and Bangor Annex accounted for about one-third of the county's total employment. A breakdown of county civilian force employment for the year 1972 follows.

Table II-26. KITSAP COUNTY CIVILIAN LABOR FORCE

Employment category	Number of persons
Total civilian labor force	36,600
Unemployed	3,300
Total employed	33,000
Agriculture	1,000
Mining, forestry and fishing	200
Contract construction	900
Manufacturing	900
Transportation, communications and utilities	900
Wholesale and retail trade	4,900
Finance, insurance and real estate	800
Services	3,300
Domestics, self employed and unpaid family workers	3,400
Government (Federal, state and local)	17,000
Federal only	(12,100)

Source: Reference 30

By way of comparison, mid-1974 Kitsap County data on Covered Employment (which generally excludes agricultural employment and classifies employment slightly differently than the preceding 1972 County Civilian Labor Force breakdown) is presented in Table II-27.

To some extent, the relatively higher skills required at the naval installations are reflected in the occupational distribution of the county civilian force. The 1970 ratio of white-collar to blue-collar workers in the county was similar to that in the nation as a whole.

However, within the blue-collar category (craftsmen, operatives and laborers) almost 60 percent of Kitsap County workers belonged to the skilled craftsman category, compared to a national proportion of approximately 33 percent (Reference 3).

Table II-27. COVERED EMPLOYMENT IN KITSAP COUNTY
(September 1974)

Employment category	Number of persons
Total covered employment	29,531
Agriculture, forestry and fisheries	125
Mining	38
Contract construction	1,090
Manufacturing	1,045
Transportation, communications and utilities	953
Wholesale and retail trade	5,609
Finance, insurance and real estate	900
Services	3,855
Government (Federal, state and local)	15,916
Federal only	(14,535)

Source: Reference 30

INCOME

The following information on income levels in Kitsap County was largely derived from the Trident Support Site Terminal Environmental Impact Statement and the publication "Manpower Profile" from the U.S. Department of Labor (References 3 and 31). Median family income in Kitsap County in 1969 was $10,541 (12 percent higher than the national median family income of $9,430); a large segment of the population fell into the middle income level while several localized areas contained both higher and lower income levels. Median white family income was $10,617, compared with $8,273 for blacks and $7,946 for other groups; more than $15,000 was earned by 5,525 families (21 percent of the county total). In 1969 most county households earned income from direct wages and salaries, with 9 percent depending on self-employment and 15 percent receiving social security payments. About 45 percent of all households identified additional sources of income, suggesting that income comes, to a large extent, from retirement sources other than Social Security. This is a characteristic of predominantly military communities where retired military personnel commonly work at other jobs. A total of 8,828 persons (9.1 percent of all county residents) comprising 1,936 families (7.3 percent of all households) received less than poverty level income. The 'near poor'--persons with incomes less than 125 percent of poverty level--totalled 11,534 (11.9

percent of total county population), while the 'poor poor'--persons with less than 75 percent of poverty level--numbered 5,925 (6.1 percent). Mean income of families below poverty level was $1,602. Public assistance provided income for about 4 percent of county households.

HISTORY

The Kitsap Peninsula was inhabited by the Suquamish and Clallam Indians before the European explorers arrived (Reference 20). They existed on a seasonal subsistence basis. Chief Sealth and Chief Kitsap are the two most famous Squamish.

The English explorer, Captain George Vancouver, was the first visitor to the area. He sailed into Puget Sound in 1792 and gave names to such areas as Port Orchard Bay and Restoration Point. In 1841, Captain Charles Wilkes arrived and named Sinclair Inlet, Dyes Inlet, Agate Passage and others.

Homesteaders began populating the area in 1850, concentrating principally along the coast. A timber industry developed in response to a need for lumber to provide housing in San Francisco during the California gold rush. Five of the largest sawmills in the world were established in areas surrounding the planning area, including Port Gamble, Port Madison, Port Orchard, Port Blakeley and Seabeck. The Port Gamble sawmill is still operating today. Until 1944 when the U.S. Naval Base was established at Bangor, the timber industry was the region's main industry.

In 1857 Kitsap County, originally called Slaughter County, was created from portions of Jefferson and King Counties. Settlers founded small villages such as Poulsbo, Keyport, Port Orchard, Silverdale, Manchester and Traceyton. They came largely from the eastern and midwestern United States between the years 1850 and 1870 and were generally of German, English and Scandinavian descent. Further settlement was induced by the Great Northern Railroad terminus in Seattle in the 1880's and by the 1890's Klondike gold rush. Immigrants from northern Europe began arriving after World War I.

Kitsap County has been developing slowly. The Puget Sound Naval Shipyard was established in 1891 by the Federal government. The town of Bremerton arose on the eastern outskirts of the shipyard. Other naval installations were later established at Keyport and Bangor which provide the county with a major source of revenue. Kitsap County is still principally a rural area which is slowly becoming urbanized in planned growth regions.

The proposed Trident Support Site to be built at the U.S. Naval Base in Bangor has just been approved. Completion of this facility is expected in 1983. A population increase of approxiamtely 30,000 people has been projected to occur in Kitsap County due to Trident. This will cause major impacts in the area as far as resources, economic and socio-cultural conditions are concerned.

ARCHAEOLOGY

Prior to findings of an archaeological survey of the planning area done in mid-December 1974, the National Register of Historic Places and the Site Survey Records for Kitsap County from the University of Washington indicated that there were no known sites of archaeological or historical significance within the planning area (see Appendix G). The archaeological survey revealed one minor site located near the Brownsville Marina or Burke Bay, a shell midden which has been essentially destroyed by historic and modern activities such as road construction and dredging operations. Because of the extensive destruction, the investigating archaeologist has judged that further investigation of the site would not yield any cultural information of value. No other historical or archaeological sites have been identified in the planning area.

EXISTING LAND USE

The major land use in Kitsap County is low density residential, including both primary and seasonal residences. Within the planning area the principal urban concentration occurs in the unincorporated town of Silverdale. The other area of concentration is in Brownsville, which is undergoing transitional growth to higher densities.

There is a large U.S. Naval reservation on the northwest portion of the planning area. The land surrounding the naval base is largely rural and dominated by residential, agricultural and open-space use. Residential and recreational use characterizes the land in the southern portion of the planning area.

Year-round residences and vacation homes occur primarily along the shorelines, but suburban residential developments have been increasing in the inland areas during recent years.

Due to the beauty of the area, recreational and open-space land uses tend to be more important than agricultural land use. Natural understory and lushly wooded forests provide an aesthetically pleasing landscape. The farms in the area are generally small, widely scattered and operated on a part-time basis. Forestry occurs in some portions, while commercial land uses are associated primarily with the urban areas.

Most of the planning area falls within central Kitsap County. Total land area for that portion of the county is 81,850 acres. The Harstad study for central Kitsap County (Reference 27) indicates that in 1968, 10 percent of this area was developed. Developed land included all land in use categories other than open space, where open space is defined as "areas of undeveloped land used for agriculture, forestry, grazing, etc., and areas where topography is too severe for development." A breakdown of developed land for this area is shown in Table II-28.

Table II-28. LAND USE ON CENTRAL KITSAP COUNTY

Land use	Percentage of developed land	Acres, no.
Developed		
Residential		
Single family	56.1	4,614.5
Multiple family	.2	17.7
Trailers	.1	9.9
Commercial	.5	42.6
Manufacturing	0.0	0.0
Parks and recreation	4.7	390.3
Public	38.1	3,130.1
TOTAL	100.0	8,221.4
Undeveloped		73,358.8
Total land		81,580.2

Source: Reference 27

DEMOGRAPHY

The impacts on the study area population as a result of the Trident base were studied by A. D. Little, Inc. and were recently made public in their report entitled, "Analysis of Selected Impacts of Trident Related Population Growth in Kitsap County; A Report to the Central Puget Sound Economic Development District" (Reference 56). The new data are shown in Table II-29 together with previous estimates, given to facilitate comparison. The A. D. Little report presents some minor differences from estimates contained in paragraph 2, page II-76 of the draft EIS. Table II-30 contains annual population projections which appear in the A. D. Little report, substantially expanding the projections found in the draft EIS.

Table II-29. KITSAP COUNTY POPULATION

Selected area of impact	1960 [a]	1970 [b]	1970 [c]	1975 [c, d]
Bremerton	28,922	35,307	35,307	37,132
Port Orchard	2,778	3,904	3,904	4,065
Poulsbo	1,505	1,856	1,861	2,415
Winslow	919	1,451	1,529	1,810
Unincorporated areas	52,293	59,131	61,054	70,802
TOTAL	86,417	101,649	103,655	116,224

[a] U.S. Census.

[b] Reference 32.

[c] From A. D. Little report (Reference 56).

[d] Includes locally stationed military and dependents.

Table II-30. ANNUAL POPULATION PROJECTIONS FOR KITSAP COUNTY [a]

	Civilian population		Military population		Total population	
Year	Without Trident	With Trident	Without Trident	With Trident	Without Trident	With Trident
1975	103,407	103,407	11,073	11,073	114,480	114,480
1976	105,170	109,593	11,073	11,343	116,243	120,936
1977	107,013	116,287	11,073	12,100	118,086	128,387
1978	108,083	120,350	11,073	14,086	119,156	134,436
1979	109,147	124,374	11,073	16,699	120,220	141,073
1980	110,207	127,710	11,073	18,299	121,280	146,009
1981	111,261	129,019	11,073	20,397	122,334	149,416
1982	112,310	130,240	11,073	21,400	123,383	151,640
1983	113,354	131,456	11,073	23,068	124,427	154,524
1984	114,393	132,619	11,073	24,509	125,466	157,128
1985	115,427	133,653	11,073	24,544	126,500	158,197
1986	116,457	134,683	11,073	24,549	127,530	159,232
1990	121,682	139,908	11,073	24,549	132,755	164,457
1995	128,214	145,449	11,073	24,549	139,287	170,989

[a] Figures represent January totals.

Source: Reference 56.

It is estimated that by 1990 the population distribution in Kitsap County with and without the Trident Support Site development will be as follows.

	1990 population percentage	
	With Trident	Without Trident
Kitsap County	100	100
North Kitsap	12	14
Central Kitsap	57	59
South Kitsap	21	19
Bainbridge Island	10	8

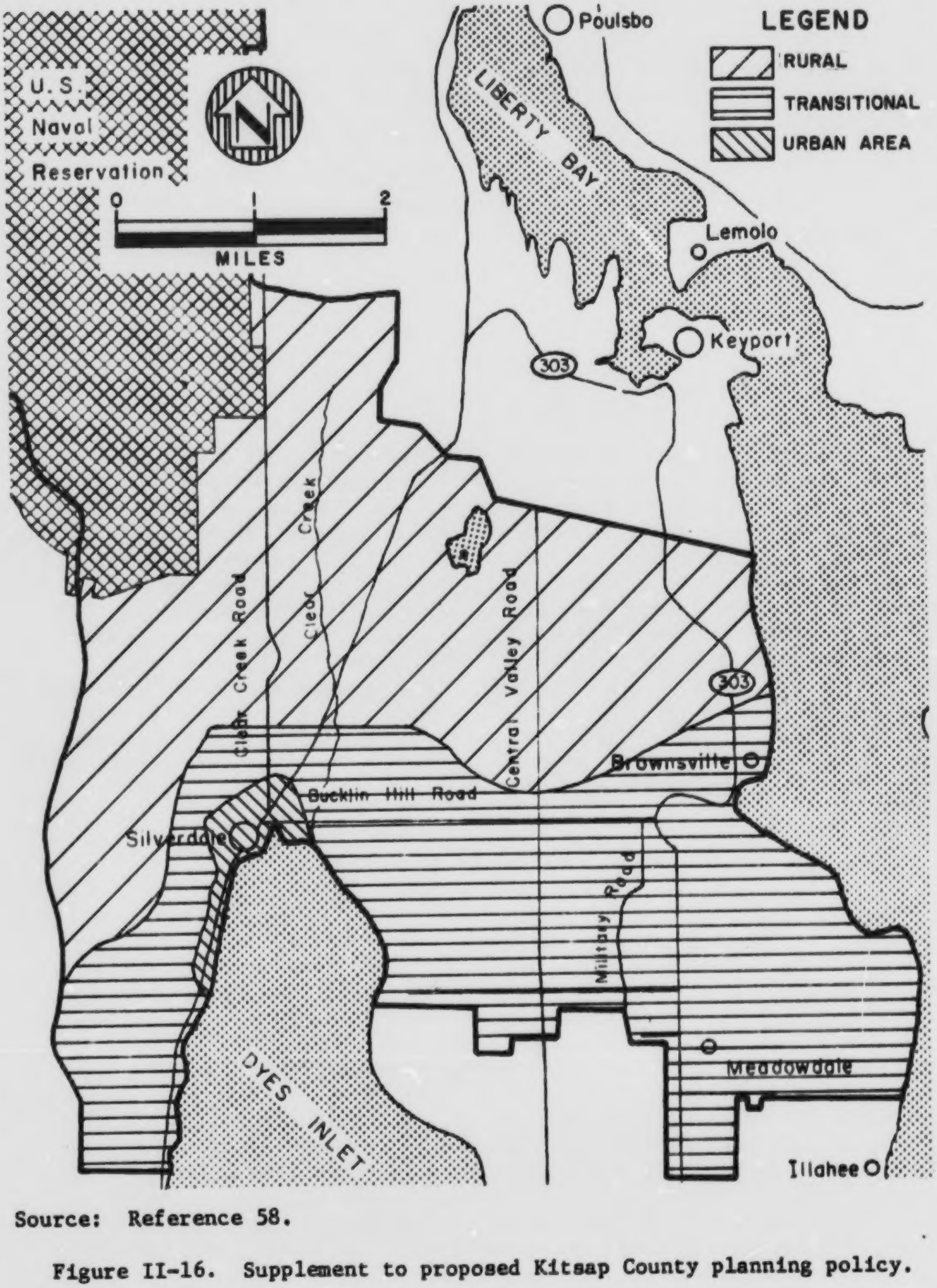
According to the 1970 census, 96.1 percent of the population was white, with blacks accounting for 1.4 percent and other groups, 2.5 percent. The population characteristics of the county population tended to differ from the state in general. As an example, 9.98 percent of the population was 65 or older in 1970, compared to a statewide average of 9.4 percent. Because of this fact, a higher than average number (15 percent) of county population receives Social Security payments. Due to the presence of the military (the economy of the county is heavily dependent on employment related to the U.S. Navy), the percentage of males (51.2 percent) was higher than the state average of 49.5 percent. Approximately 15 percent of the 1970 population was military personnel and dependents, and this proportion increased significantly whenever large ships were in port. Approximately 25 percent of 1970 county population was of school age.

FUTURE POPULATION DISTRIBUTION

The new population that will be added to Kitsap County and, particularly, to the study area, will be limited in location by three constraints: the County Plan, location of existing transportation, and location of the sewer interceptors and feeders.

An amended element of the Kitsap County Comprehensive Plan, approved on 24 June 1975 by the Kitsap County Planning Commission and on 28 July 1975 by the Board of Kitsap County Commissioners, is titled Planning Policies; Outline for the Future Growth of Kitsap County, Washington (Reference 58). Figure II-16 is taken from this plan.

Four categories of land use intensity are described in the plan: rural, transitional, urban and redevelopment areas, all but the last of which are represented in the study area.


Poulsbo
LEGEND
RURAL
TRANSITIONAL
URBAN AREA
U.S.
Naval
Reservation
N
0
1
2
MILES
LIBERTY BAY
Lemolo
Keyport
303
Clear Creek Road
Clear Creek
Central Valley Road
303
Brownsville
Bucklin Hill Road
Silverdale
Military Road
Meadowdale
DYES INLET
Illahee

Source: Reference 58.

Figure II-16. Supplement to proposed Kitsap County planning policy.

Residential development is considered desirable in urban areas, as stated in the element (page 1): "Briefly stated, it is the County's policy and goal to encourage development to take place in close proximity to existing urban centers." Transitional areas, which are defined in the element as "adjacent to urban areas" (page 1) may be considered for installation of municipal service facilities as part of coordinated development. "Rural areas," however, "are located ... where urban development should not occur."

Kitsap County is predominantly rural in character. As of the 1970 census, 55.8 percent of the county's population lived in rural areas which fringe the primary urban center of Bremerton and the smaller centers of Winslow, Port Orchard and Poulsbo. Areas surrounding Liberty Bay, Bainbridge Island and Dyes Inlet also contain a portion of the rural population. In contrast, the urbanized population is clustered in a number of cities, such as Bremerton, Winslow, Port Orchard and Poulsbo, as well as in the unincorporated centers of Silverdale, Kingston, Suquamish, Indianola and Manchester.

Current growth trends identified in the county include: a declining dominance of Bremerton; sectional shifts in new population growth, with population increasing in the southern portion of the county at the expanse of the central and northern portion; and an increasing dispersal of population throughout rural and urban fringe areas due in part to preferences for single-family dwellings located in semirural areas.

Factors influencing these current trends include private market forces and public policy. Private market forces have had a predominant influence on the nature of population patterns and have consisted of strong housing preferences for detached single-family dwellings and a tendency to develop small but costly housing projects because of fragmented land ownership. Influential public policies include zoning practices which have encouraged dispersed development; construction of new roads, which has released adjacent land for development; and the construction of utility lines, which has also allowed adjacent population growth to occur.

Future population growth trends will be influenced by additional factors, according to the A. D. Little report. The county's physical and environmental characteristics will play a more definitive role in determining growth since future growth will occur in the county's interior, where land is available, rather than along the shoreline, where growth has traditionally occurred. Future development of the county will therefore be subject to consideration of topographic barriers, unstable slopes, unsuitable soils, geology and hydrology. Growth will be substantially influenced by the development of the Trident facility, which will bring in military and civilian personnel. According to the A. D. Little report,

> ...*the recognition by a large number of people throughout the County of a Trident base will not only result in probable higher levels in in-migrants that can fill the construction jobs but a higher level of in-migrants related to the expectation of jobs during the operation of the base* (p. II-25).

Table II-30 contains population projections to 1995 and depicts the anticipated growth of civilian and military populations with and without the development of Trident.

Four alternative population growth models were developed by A. D. Little, Inc. to illustrate means of managing future population growth in Kitsap County. All models were defined in line with specific planning parameters, which included density factors, housing mixes, physical and environmental constraints and requirements for schools, shopping and roadway facilities and water supply and sewer systems. Additionally, all models except one consider the population growth induced by Trident. Because the Trident facility development appears certain, the fourth model or Current Trends Model without Trident, will be dismissed from further discussion.

The first model, or Current Trends Model with Trident, considers future population growth on the basis of past and present population trends and projects them into the future. This model predicts that rapid and decentralized population growth and housing construction would take place in the more rural areas and in fringe areas around major urban areas. Densities in urban areas would be high since there is a lack of available land; rural densities would be low because development would be scattered and devoted to detached, single-family units. In terms of timing, growth would be dispersed, with new development occurring simultaneously in different locations. As estimated, land required for such development would consist of 23,554 acres, or a 60 percent increase over that used currently for residential and related purposes.

The second model, or the Urban Concentration Model, suggests that future growth could take place adjacent to existing urban centers in order to concentrate or cluster the population. It is anticipated, consequently, that no Trident-related growth would occur in the southern portion of the county or on Bainbridge. New housing would develop in high densities with decreased land consumption so that services would be extended in an orderly fashion. Land required to manage this type of growth would equal that utilized without Trident's development, if current population growth trends were carried into the future.

The third model, or New Town Model, calls for the creation of a new town, which would accommodate the Trident-induced population increases. By creating such a town, impacts of Trident would be eliminated in existing urban centers such as Poulsbo and Silverdale and in northern rural areas. Instead, the population (estimated at 11,000 by

1985) would be concentrated in northern Kitsap County in a town created near the Bangor Annex. Densities would be low since primarily single-family detached dwellings would be built, but the land required for such development would be only 20 percent of that required in the Current Trends with Trident Model.

Within the study area, the limits of the second constraint are shown in Figure II-17, indicating that development will most likely take place in the areas served by Bucklin Road, State Route 3, State Route 303, the southern portion of Clear Creek Road, and Anderson Hill Road, extending from Silverdale to the northwest.

The added Kitsap population, with or without the proposed wastewater project, would tend to concentrate in the areas described above.

The third constraint--the sewer pipeline--will serve to locate expanded populations within the "transitional area" in the study area, regardless of which pipeline route is ultimately chosen.

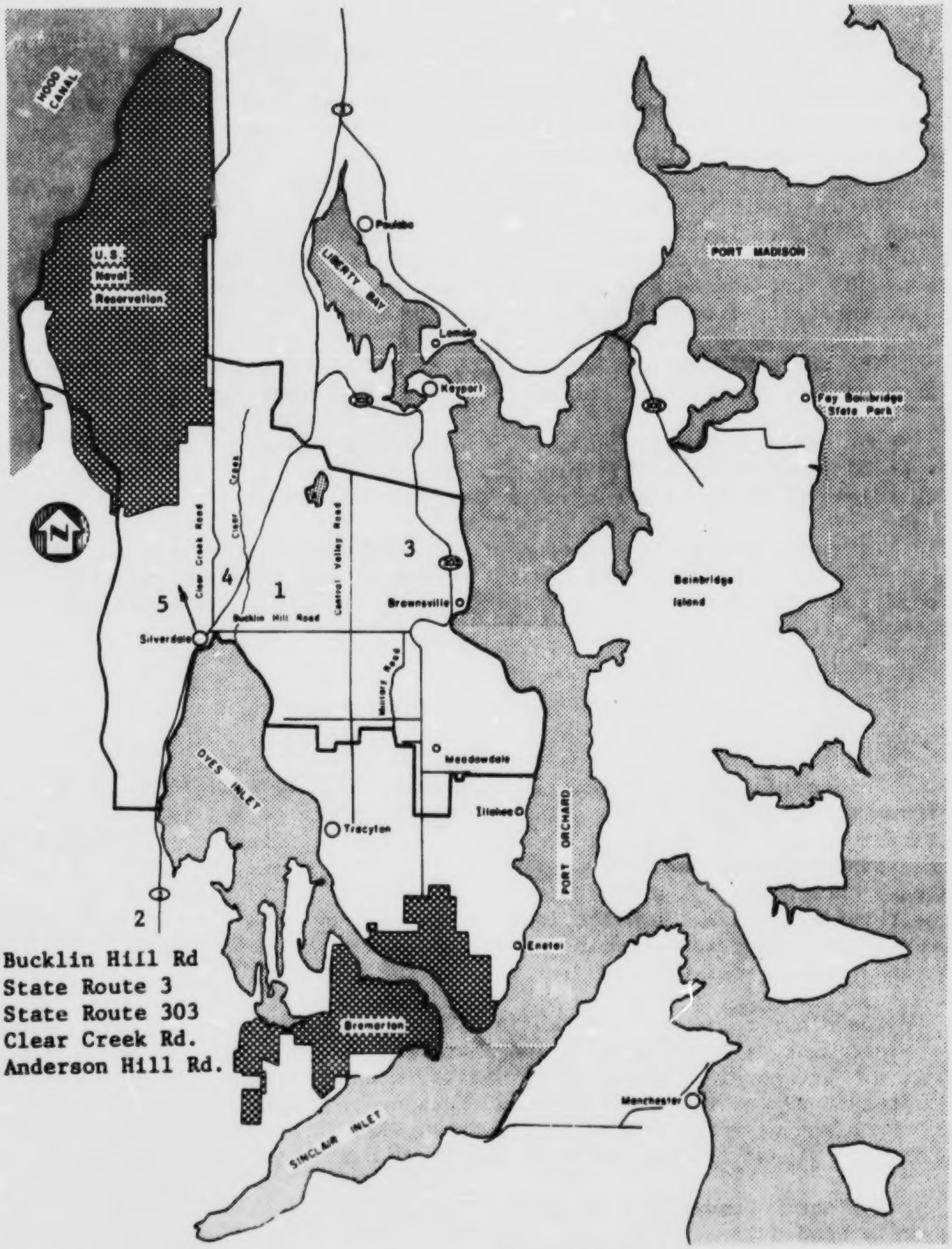
In summary, the distribution of the increased populations is expected to diffuse within the limits imposed by the County Plan, with concentration along the major transportation corridors and pipeline routes.

VISUAL AND AESTHETIC ENVIRONMENT

The study area has an extremely pleasing visual and aesthetic environment. The heavy predominance of wooded greenery and the low population density in the rural areas have created a relaxing atmosphere of escape for many dwellers. Of particular beauty are the shoreline areas, and the public's appreciation of these areas is evidenced by the relatively high shoreline land costs, ranging from $200 to $600 per front-foot. Shoreline housing is predominantly low density and frequently blends well with the terrain.

The older residential areas in Silverdale and Brownsville have, in general, aged with a special quiet charm and remain desirable for habitation. New housing tracts, principally in the Meadowdale area around Military Road and Bucklin Hill Road, that are now under construction or in the planning stage are being developed with an appearance typical of urban sprawl and retain little of the rural character of the region.

The north Brownsville proposed treatment plant site occupies a heavily wooded 15-acre portion of a 40-acre lot that adjoins an open, marshy field. State Highway 303 passes through the extreme northeast corner of the proposed site. The wooded portion contains young trees


HOOD CANAL
U.S. Naval Reservation
Poulsbo
LIBERTY BAY
PORT MADISON
Lemolo
Keyport
Fay Bainbridge State Park
N
Clear Creek Road
Clear Creek
Central Valley Road
3
4
1
5
Brownsville
Bainbridge Island
Buckin Hill Road
Silverdale
Military Road
Meadowdale
DYES INLET
Illahee
PORT ORCHARD
Tracyton
2
Enetai
Bremerton
Manchester
SINCLAIR INLET

1. Bucklin Hill Rd
2. State Route 3
3. State Route 303
4. Clear Creek Rd.
5. Anderson Hill Rd.

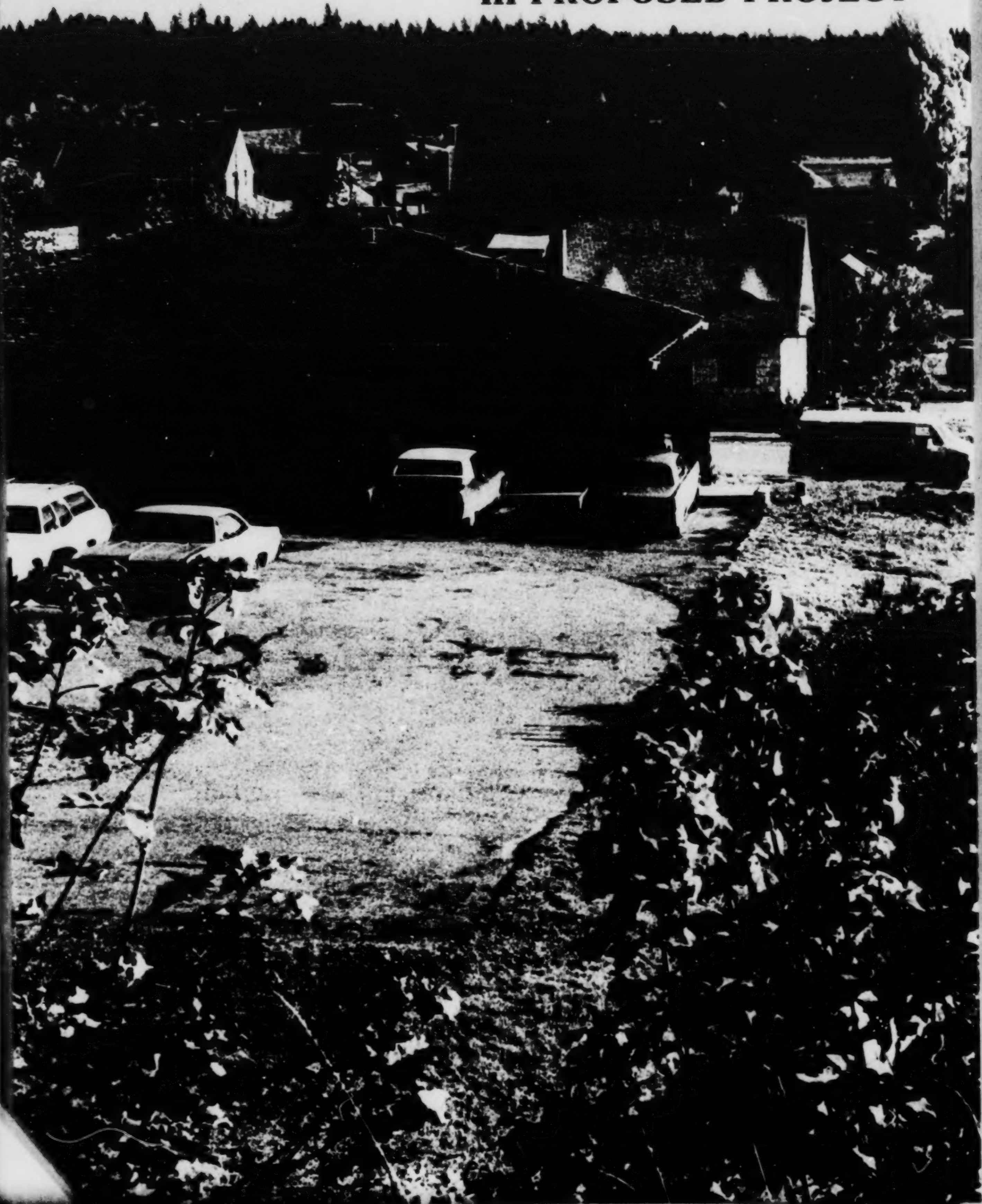
Source: Reference 1

Figure II-17. Major routes

and a great amount of fallen timber, indicative of recent logging activities. This, combined with standing water observed during a December site visit, produces a littered appearance. There is a scrapped automobile yard located directly across the highway from the proposed site.

Sewage treatment plants can be designed with architectural flair and landscaping to provide a not unpleasing appearance. Nevertheless, they will retain a commercial or semi-industrial atmosphere that may be ill-suited for certain locations. In general, sites that have adequate screening, are relatively remote from residential neighborhoods and do not intrude upon the landscape are aesthetically the most acceptable.

III PROPOSED PROJECT



CHAPTER III

PROPOSED PROJECT

INTRODUCTION

The proposed plan contains provisions for the transport of sewage from sewered concentrations of population, treatment of the sewage to levels compatible with receiving water quality criteria and discharge of treated effluent to the final disposal site. Wastewaters would be collected from drainage sub-basins 9 and 10 in north-central Kitsap County, the Trident Support Site, now under construction in the U.S. Navy Keyport Torpedo Station Bangor Annex and Poulsbo. Poulsbo's decision to participate has not been finalized but is included as the preferred alternative. Provisions have been made to accept Keyport and Keyport Torpedo Station wastewaters if those entities decide to join the regional system. Detailed descriptions of sub-basins 9 and 10 are provided in Chapter II, Envircnmental Setting.

Design Flows and Quality

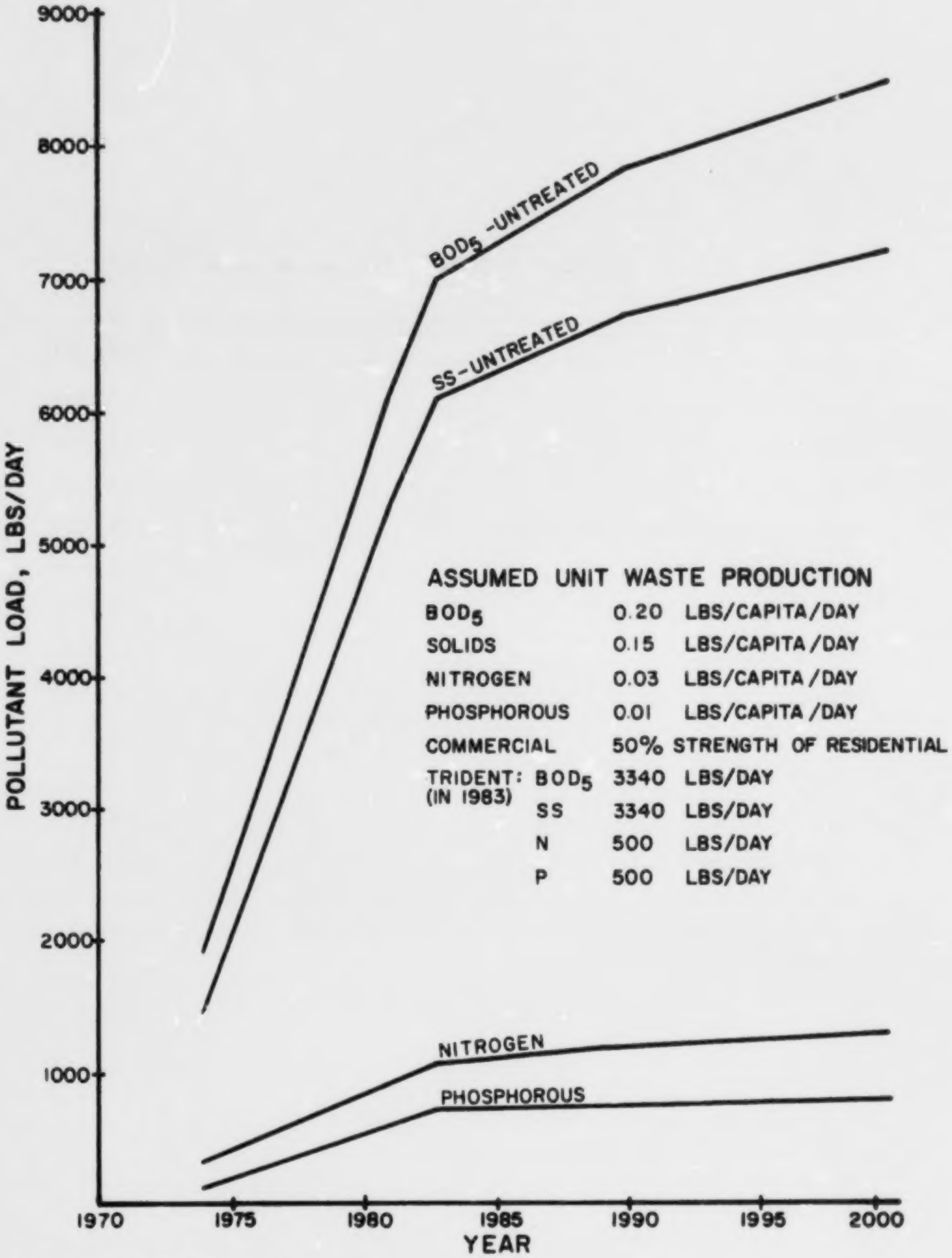
The facilities planning consultant has estimated that the study area population will rise to approximately 21,500 in the year 1995 from a 1975 population of 10,500, due in large part to the influx of population associated with the Trident Support Site. This population value was based on studies conducted by the Puget Sound Governmental Conference (Reference 33), the Comprehensive Water and Sewerage Plans for Central Kitsap County (Reference 46) and Arthur D. Little Co. (Reference 56). Of this population, it was predicted that only 18,000 persons would be connected to the ultimate sewerage system. The impact of a viable sewerage system upon population growth and sewer connections will be examined in Chapter IV, Environmental Impacts.

The 20-year design flow, for 1995, was estimated at 3.8 million gallons per day (mgd) of average daily flow from the study area. This value includes 85 gallons per person per day (gpcd) of average dry-weather flow and 15 gpcd of daily infiltration of groundwater into the sewers. Inflow of storm water to the system through openings such as manhole covers would further temporarily raise the daily flow value. Commercial and institutional flow exclusive of Trident Support Site wastes are estimated to total 0.3 mgd. Further details may be found in Appendix L of the Draft Facilities Plan (Reference 1). It is not intended to collect storm water runoff into the system, and the sewer design would attempt to minimize such inflow. The division of sewage flows in 1995 is estimated to be as follows: sub-basin 9 at 1.1 mgd, sub-basin 10 at 0.7 mgd and the Trident Support Site at 2 mgd. The addition of Poulsbo's and Lemolo's wastes would raise the total flow to 5.3 mgd.

Wastewaters originating through 1995 are expected to be of typical domestic sewage quality, containing approximately 230 milligrams per liter (mg/l) of biochemical oxygen demand and 200 mg/l of suspended solids. The untreated waste loads assumed by the facilities planner are presented in Figure III-1 (Reference 1). Typical domestic wastewaters provide no problems to the standard sewage treatment processes.

Industrialization within the study area is virtually nonexistent and is expected to remain so during the planning period. The major future source of nondomestic wastewaters is the Trident Support Site. Although the bulk of the sewage from the Trident Support Site will be domestic in origin, there will be some contributions from drydocks and repair facilities. The U.S. Navy projection of 2 mgd of average daily flow from the Trident Support Site (Reference 3) is presented by sources in Table III-1. It is not possible to predict, before the facility is constructed, the exact quantities of industrial waste that may be produced because of two principal factors: (1) a large portion of shipyard wastes results from seepage and washdowns in drydocks (Reference 47), and (2) the military retains the prerogative of changing the nature of activities conducted at its military bases. With regard to the second item, conversation with Trident Support Site personnel indicated that current plans do not call for any major ship repair activities at the drydocks. There can be no guarantee, however, that this situation will not change at some time in the future.

It is the intent of the U.S. Navy to provide pretreatment to all industrial wastes to attain compatibility with standard sewage treatment processes adopted by the County. A series of analyses of untreated drydock drainage waters at other locations has indicated notable quantities of chlorides, hydrocarbons, chromium, copper and zinc (Reference 47). With the exception of chlorides, the oils and metals can be appropriately reduced by existing treatment systems. The use of fresh water for cleaning ship hulls and for dust control can greatly reduce the chloride content of the discharges to that originating from leakage and infiltration in the drydocks. Chloride content is of concern only if effluent is disposed to land or fresh water, or sewage sludges to agricultural land.



Source: Reference 1.

Figure III-1. Estimated untreated waste loads

Table III-1. TRIDENT SUPPORT SITE WASTEWATER SOURCES

Source [a]	Flow, gpd
Training facility	158,500
Commissary, PX	383,100
BEQ, BOQ	238,500
Public Works (machine shops)	128,100
Waterfront	94,300
Naval torpedo station	34,800
Refit facility	114,600
Weapons facility	140,100
Housing	504,000
Utility plants	4,000
Ship wastes	100,000
Infiltration	100,000

[a] Approximately 200,000 gallons per day to industrial wastewater pretreatment facility.

Source: OICC Trident letter of 16 April 1976 to EPA.

The Trident Base will have to treat their industrial wastes to a level compatible with a domestic sewerage system according to federal regulations. The County will specify in their contract with the Navy what constituents of the wastes will be allowed. This contract will be drawn up after the recommendation in the Final Facilities Plan is considered. Table III-2 contains the recommended concentration of wastewater pollutants for Trident Support Site effluent (Reference 61).

The U.S. Navy intends to collect and treat separately for local discharge all storm water runoff occurring at the Trident Support Site. Title 40 of the U.S. Code, Chapter 1, Subchapter D. Part 128 specifies that industrial dischargers to publicly owned treatment works must use best practicable control technology to remove, before discharging to the sewer system, pollutants incompatible with the treatment processes.

INTERACTION WITH OTHER PLANS

The development of potential wastewater treatment service areas beyond the boudaries of the study area, as defined by the Washington State Department of Ecology, requires coordination of planning with the facilities plans of the affected sub-basins. The proposed plan would involve the collection of untreated wastewaters from the towns of Poulsbo and Lemolo and their incorporation into the disposal scheme. The citizens of Keyport and the Keyport Torpedo Station can, if they wish, also join the regional system. At the time of this writing, Poulsbo's decision on joining the regional system has not been finalized.

Poulsbo and Lemolo

The Poulsbo Facilities Plan, originally prepared in June 1974 (Reference 48) is currently undergoing revision and reevaluation of alternatives, with the inclusion of possible joint treatment or disposal with study area wastewaters. Wastewater flow estimate for the Poulsbo service area is approximately 1.0 mgd of average daily dry-weather sewage flow, with no industrial components. The facilities plan for the Poulsbo planning area estimates that this includes 0.15 mgd of infiltration flow. In view of the size of the service area (2,889 acres), the length of the existing sewerage system (58,070 lineal feet) and the EPA requirements for correcting faulty sewers (Reference 49), this is a reasonable estimate.

The development of the proposed plan, with its involvement in the treatment of Poulsbo's and Lemolo's wastewaters, has been coordinated with the citizens and facilities planning consultant for the area. Although the Poulsbo Facilities Plan has not yet reached the stage of

Table III-2. RECOMMENDATIONS FOR POLLUTANT LIMITS FROM TRIDENT SUPPORT SITE

Constituent	Average concentration, mg/l	Daily load, lb/day
Copper	[illegible]	[illegible]
Zinc	[illegible]	[illegible]
Total chromium	0.5	[illegible]
Nickel	0	0
Lead	0.1	1.7
Boron	1.0	16.7
Cadmium	0.003	0.05
Silver	0.03	0.5
Vanadium	10.0	167.0
Mercury	0	0
Iron	0.6	10.0
Magnesium	1,000.0	16,680.0
Aluminum	2.7	45.0
Manganese	0.3	5.0
Sulfides	1.4	23.4
Sulfates	500.0	8,340.0
Ammonia (un-ionized)	0.08	1.3
Sodium	3,500.0	58,380.0
Potassium	2,500.0	41,700.0
Calcium	2,500.0	41,700.0
Arsenic	0.1	1.7
Free cyanide	0.2	3.3
Phenolic compounds	20.0	334.0
Chlorinated hydrocarbons	0.02	0.3
Oil and grease (petroleum based)	50.0	834.0
Total phosphorus	10.0	167.0
Total nitrogen	35.0	584.0
BOD_5	240.0	4,005.0
Suspended solids	300.0	5,005.0
Temperature	90°F	
pH	60 - 9.0	

Source: Reference 61

selection of a preferred alternative, the planning consultant has been notified by letter of the proposed system, which would receive raw sewage from Poulsbo for treatment at the regional facility (Reference 57). Similarly, the Lemolo Citizens Club has been notified of the proposed plans and their comments solicited (Reference 59). Although Lemolo is not currently sewered, this situation may change with time and the availability of a wastewater treatment system. If Poulsbo should choose not to join the regional facility, this EIS will not be invalidated. The resulting systems would be essentially that of alternative No. 5.

Keyport

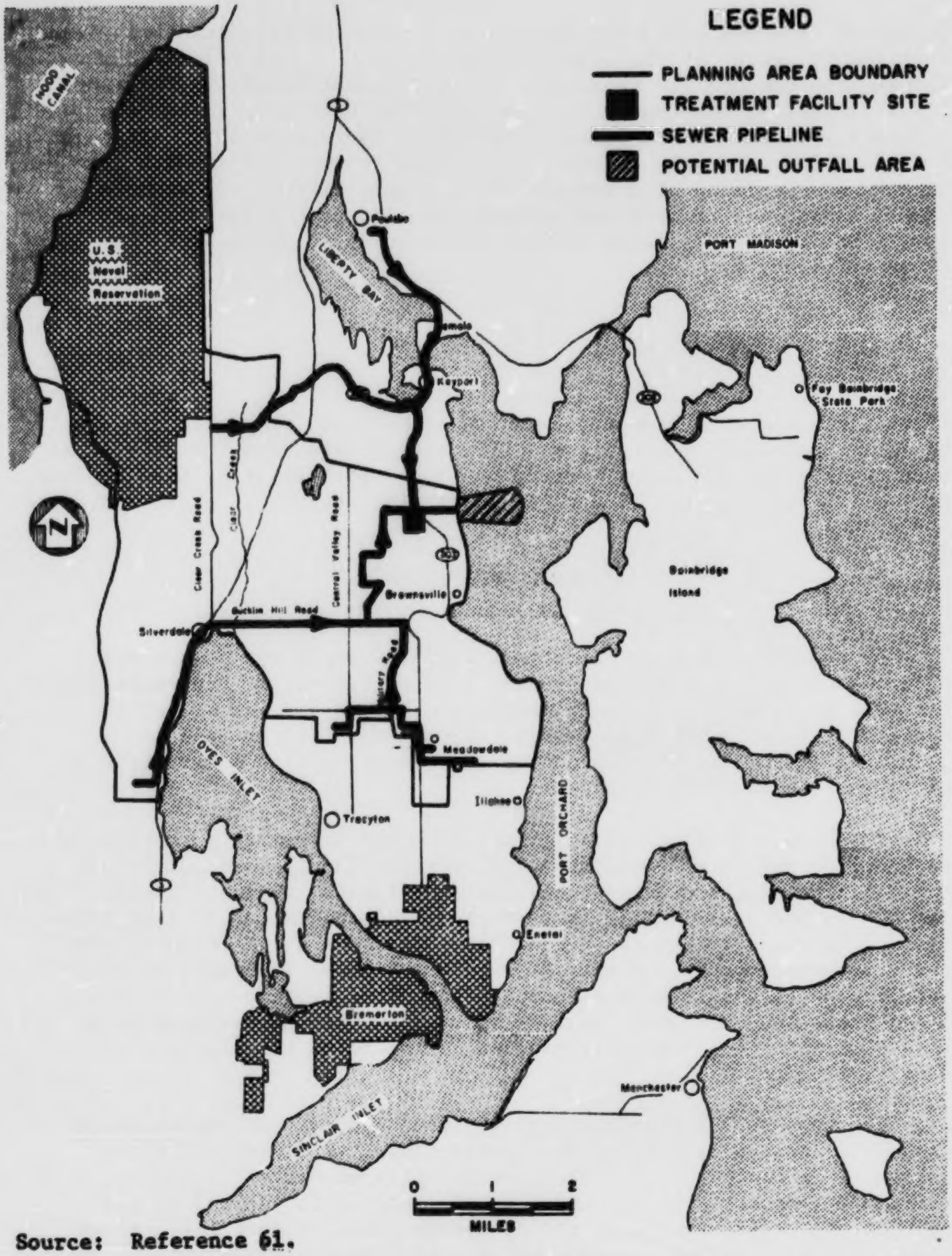
With a design wastewater capacity of 4.8 mgd, provision can easily be made to accomodate the 0.2 mgd flow anticipated from the City of Keyport and the Keyport Naval Torpedo Station. Both entities have been notified of the willingness of a regional facility to accept their wastewater.

PROPOSED SYSTEM

A regional wastewater treatment facility would be located north of Brownsville. This facility would receive 3.8 mgd of raw wastewater from the study area and the Trident Support Site and 1.0 mgd of raw wastewater from Poulsbo and Lemolo. Provisions will be made to accomodate an additional 0.1 mgd of raw sewage each from Keyport and the Keyport Naval Torpedo Station.

Raw sewage from sub-basins 9 and 10 would be pumped to the north Brownsville site from Bucklin Hill Road along County Road 13 and Old Military Road right-of-ways. Poulsbo's wastewater would be pumped through sewers placed along State Highway 305 to Lemolo and then across Liberty Bay to the Keyport Sewage Treatment Plant site. From Keyport the wastewater would go southwest to State Highway 303 where it would join sewage that will have been pumped from the Trident Support Site along Luoto Road and State Highway 303. The combined wastewaters would then go south along State Highway 303 to the north Brownsville treatment plant site.

The proposed Brownsville facility would provide secondary level wastewater treatment with an appropriate level of disinfection for discharge to Port Orchard. The treated effluent outfall would be buried in a county drainage easement eastward to the shoreline and then be placed underwater to the discharge site. Figure III-2 shows the locations of major elements of this alternative plan.


LEGEND
PLANNING AREA BOUNDARY
TREATMENT FACILITY SITE
SEWER PIPELINE
POTENTIAL OUTFALL AREA
HOOD CANAL
U.S. Naval Reservation
Poulsbo
LIBERTY BAY
PORT MADISON
Lemolo
Keyport
Fay Bainbridge State Park
N
Clear Creek Road
Clear Creek
Central Valley Road
Bainbridge Island
Brownsville
Bucklin Hill Road
Silverdale
Meadowdale
DYES INLET
Tracyton
Illahee
PORT ORCHARD
Enetai
Bremerton
Manchester
SINCLAIR INLET
0 1 2
MILES

Source: Reference 61.

Figure III-2. Alternative plan no. 11.

Project Features

Western Shore of Dyes Inlet

The western shore of Dyes Inlet would be served by a combination of gravity sewer and force main, starting from just north of the community of Chico and continuing to and including the town of Silverdale. The sewer lines, ranging from 10 to 12 in. in diameter, would be placed along the rights-of-way of Old State Route 3 and local streets. A connection would be provided between Silverdale and pumping station No. 10 through a sewer line located on Clear Creek Road.

Brownsville Community

The community of Brownsville would be provided with sewerage service through a force main placed along State Route 303 and leading to an intersection with the Bucklin Hill Road interceptor. At that location, the combined sewage will be pumped on to the treatment plant location.

Meadowdale Area

Communities and new developments in the vicinity of Meadowdale along the southern study area boundary and east of Dyes Inlet would receive sewerage service. General pipeline locations are presented with the description of the proposed plan.

Sewage Sludge Disposal

The treatment of wastewaters results in the production and separation of organic and inorganic solids, principally biological matter with some greases and large particulates. These solids are initially biologically active; that is, they undergo decomposition and exert an oxygen demand. The typical new wastewater treatment facility would stabilize these solids by anaerobic digestion, and they would subsequently be dewatered by vacuum filters to approximately 25 percent solids and 75 percent water. Properly digested sewage sludges are characterized by a reduction in mass from raw sludges and a general lack of offensive odor; in other words, the available biological food has mostly been used up.

It is estimated that a wastewater flow of 4.8 mgd would result in a treated sewage sludge production rate of 17,000 pounds (wet) daily. This sewage sludge would be trucked to the Hansville Road Solid Waste Disposal site (Reference 50). In order to protect the receiving environment from many of the pollutants that are still present in sewage sludges, a proper sanitary landfill site will be utilized. Principal characteristics of such a site are a daily earth cover and, for wastes that may leach pollutants, a leachate collection and treatment system (similar to a wastewater treatment facility).

The Hansville Road sanitary landfill site has a 20-year design capacity of 517,000 tons and an ultimate capacity of 608,000 tons. It thus appears that the Hansville Road site could accomodate an estimated 62,000 to 114,000 tons of sewage sludge over a 20-year period without exceeding its total capacity but this could reduce the total landfill life by 3 to 5 years. Poulsbo's waste sludge is included in this estimate and would probably be trucked to the landfill site even if Poulsbo were to develop a separate wastewater treatment system.

Project Costs

Table III-2 presents the current estimates made by the facilities planner for total project costs of each alternative. It also shows project costs after reimbursement by the U.S. Navy for their share of construction and operating costs and the final cost to Kitsap County, after receiving subsidies from the Federal and State governments. Of the total costs of alternative No. 11, the Poulsbo planning area would contribute $3,802,000 capital and $130,000 annually for operating maintenance.

Table III-3. PROPOSED PROJECT COSTS

Type of cost	Capital cost, dollars		Annual O & M cost, dollars	Total annual cash requirement, dollars
	Total capital [a]	Annual amortization [b]		
Total project costs [c]	18,026,000	1,555,700	610,500	2,166,200
Project costs after U.S. Navy reimbursement	12,270,600	1,059,000	379,300	1,438,300
Cost to Kitsap County after U.S. Navy, EPA and State reimbursements	1,227,000	8,100	379,300	387,400

[a] In June 1975 dollars.

[b] At 5-7/8 percent for 20 years.

[c] Includes Poulsbo's participation.

IV ENVIRONMENTAL IMPACTS

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CHAPTER IV

ENVIRONMENTAL IMPACTS

The environmental impacts of the proposed facilities plan alternative are presented in this section. Environmental impacts of nine other feasible alternatives were presented in great detail in the Draft Environmental Impact Statement and in the Supplement to the Draft Environmental Impact Statement and will not be repeated here. Responses to public comments on the impacts of all alternatives will be presented in Chapter IX of this Final Environmental Impact Statement.

The environmental impacts of the proposed facilities plan (alternative No. 11) are presented on special project summary sheets which facilitate numerical evaluation of impacts. These sheets provide not only a discussion of the related impact but also the category and subcategory of classification, the definition of the environmental impact category, the boundary or extent of analysis and the method by which the analysis was conducted. A basic reference source for background information is presented along with the name of the individual providing the assessment. The rating for any particular impact is generally the subjective judgment of an evaluator technically qualified and experienced in that impact category.

The following impacts are grouped by physical, resource, economic and socio-cultural categories. Where it was felt that impact categories could be relevant to the proposed project, those factors were evaluated and, where the impact was not trivial, rated. Irrelevant impact topics, such as airport noise, are not even addressed. The ratings developed for each impact were determined by an expert in that field. The numbers developed are used in Appendix A where they are multiplied by weighting factors which represent their relative value. Weighting factors are selected to reflect community opinion, and their derivation is explained in Appendix A. Weighted scores for each impact category were combined for individual alternatives and the resulting numerical values have been presented in Chapter I.

PHYSICAL IMPACTS

The assessments of physical impacts have been divided into the following sub-categories and criteria to separate significant variables:

- Air Quality
- Noise
- Odors
- Terrestrial Environment
    - Vegetation Communities
        - Clear Creek
        - Overall study area less Clear Creek
    - Wildlife and Wildlife Habitats
    - Rare and Endangered Species
    - Freshwater Ecology
        - Clear Creek
        - All freshwater bodies except Clear Creek
- Marine Biological Environment
    - Benthic
    - Water Column
    - Surface
- Soils
- Water Quality
    - Surface Water
        - Clear Creek
        - Burkes Creek
        - All streams other than Clear Creek and Burkes Creek
        - Lakes
    - Groundwater
        - Quality
        - Quantity
- Marine Water Quality

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SES Project No. ____

☐ *Category:* Physical Impacts

☒ *Sub-Category:* Air Quality

☐ *Criterion:* ____

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project produces air pollution emissions under current regulations in the project area.

BOUNDARY: Alternative 11
Study Area and treatment facility

METHOD OF ANALYSIS:

Evaluation of known air emissions from similar sewage treatment facilities

DISCUSSION:

Properly operated sewage treatment facilities generally do not emit measurable quantities of air pollutants.

It was estimated that daily, one to two truckloads totalling 8.5 tons of dewatered, digested sewage sludge would be taken to a sanitary landfill. The exhaust emissions of the truck would be negligible in comparison to the vehicle emissions from the Study Area population.

Dust and particulates raised during construction activities can be reduced by following EPA published guidelines for minimizing fugitive dust from construction sources. It will be shown in a subsequent section that project induced population growth will be insignificant. Secondary impact air contaminants produced by such a population would also be insignificant.

SOURCE OF REFERENCE:

M. Dean High, Senior Air Quality Engineer

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RATING: 0

+100	Reduces ambient pollution by 50%.
+75	Reduces ambient pollution by 25%.
+50	Reduces ambient pollution by 15%.
+25	Reduces ambient pollution by 10%.
+10	Reduces ambient pollution by 5%.
0 ◀	No change from ambient levels.
-10	Increase ambient pollution by 5%.
-25	Increases ambient pollution by 10%.
-50	Increases ambient pollution by 15%.
-75	Increases ambient pollution by 25%.
-100	Increases ambient pollution by 50%.

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SES Project No. ___

☐ *Category:* Physical Impacts

☒ *Sub-Category:* Noise

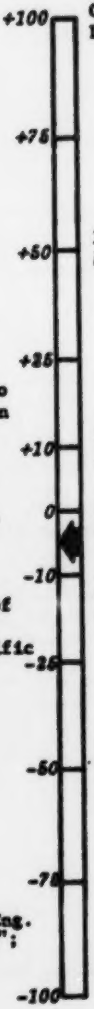
☐ *Criterion:*

☐ *Sub-Criterion:*

DEFINITION:

The affect of ambient noise level upon residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, picnic areas.

RATING: - 5



+100	Over 10 dBA decrease of L50 ambient.
+50	10 dBA decrease of L50 ambient.
+10	5 dBA decrease of L50 ambient.
0	0 dBA increase of L50 ambient.
-10	5 dBA increase of L50 ambient, few complaints if gradual.
-50	10 dBA increase of L50 ambient, more complaints, especially during sleeping hours.
-100	Over 10 dBA increase of L50 ambient, substantial number of complaints.

BOUNDARY: Alternative 11
Major roads and pipeline routes in Study Area and sewage treatment plant site

METHOD OF ANALYSIS:

Comparison of existing noise levels with estimated increases due to project. Scale based upon EPA guidelines.

DISCUSSION:

Sewage treatment facilities are relatively quiet and do not produce substantial noise outside facility location but some motor noise may be detected.

Since traffic increase is not attributable to project and major noisy roadways will remain so due to other growth factors, only slight noise levels may be attributed to trucks transporting sewage sludges to landfills once or twice daily.

Construction noise for the facility or the placement of major pipelines could be substantial and over 10 dBA but would be of short, temporary duration at any specific location.

SOURCE OF REFERENCE: M. Dean High, Sr. Air Quality Eng.
EPA NTID 300.3 "Community Noise";
EPA Region X Guidelines

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SES Project No. ____

☐ *Category:* Physical Impacts

☒ *Sub-Category:* Odors

☐ *Criterion:*

☐ *Sub-Criterion:*

DEFINITION:

The degree to which the proposed project creates odors in the project area.

RATING: 0

+100	Reduces ambient odors by 50%.
+75	Reduces ambient odors by 25%.
+50	Reduces ambient odors by 15%.
+25	Reduces ambient odors by 10%.
+10	Reduces ambient odors by 5%.
0	No change from ambient levels.
-10	Increases ambient odors by 5%.
-25	Increases ambient odors by 10%.
-50	Increases ambient odors by 15%.
-75	Increases ambient odors by 25%.
-100	Increases ambient odors by 50%.

BOUNDARY: Alternative 11
Study Area and treatment facility site

METHOD OF ANALYSIS:

Evaluation of known odor generation from similar sewage treatment facilities.

DISCUSSION:

Properly operated sewage treatment facilities of the proposed design generally do not produce noticeable objectionable odors. Due to the small size of the service area, it is expected that fresh, rather than septic, sewages would arrive at the plant. Some local odor may be noticed at the plant when (1) tank trucks deliver septic tank sludges to the treatment facility; (2) a malfunction in the sewage system delays flow to the plant; and (3) an unforeseen upset in plant process occurs.

Dewatered, well-digested sewage is relatively odor free and transport of this sludge to a sanitary landfill would would not result in odors at the landfill or during transport. A reduction in odors will be noticed in areas of septic tank failure when these areas are connected to a sewage system. This benefit would outweigh possible plant odors.

SOURCE OF REFERENCE:

M. Dean High, Senior Air Quality Engineer

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☐ *Criterion:* Vegetation Community

☒ *Sub-Criterion:* Clear Creek

DEFINITION:

The degree to which the proposed project affects the Riparian or marsh system: shore vegetation, aquatic habitat and aquatic productivity.

RATING: 0

+100	Significantly improves and promotes stable aquatic habitat and food chain.
+75	
+50	Aquatic productivity and complexity increased within system.
+25	Aquatic habitat improved or stabilized in local areas.
+10	
0	No changes reflected within present conditions.
-10	
-25	Disturbance of nearby watershed area causing deterioration of aquatic habitat in local areas.
-50	Decreases aquatic productivity promoting temporary instability within system.
-75	
-100	Significantly degrades or removes aquatic habitat and productivity.

BOUNDARY: Alternative 11
Clear Creek Pipeline Corridor

METHOD OF ANALYSIS:

On-site inspection.

DISCUSSION:

This alternative does not require a pipeline corridor down the lower Clear Creek drainage. Only 2 stream crossings are involved at Bucklin Hill Road and Mountain View Road. Both crossings are on established roads and thus should have negligible impact on the creek or environs.

Upper Clear Creek Valley will retain the present rural designation under the Kitsap County Master Plan.

SOURCE OF REFERENCE: E. Chan, Environmental Analyst
Earnshaw and Richman, Consulting Botanists

EIR Form #1016/
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Socio-Economic Systems
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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☐ *Criterion:* Vegetation Communities

☒ *Sub-Criterion:* Overall Study Area less Clear Creek

DEFINITION:

The degree to which the proposed project affects vegetation as a soil stabilizer. Site characteristics (topography, riparian location) determine degree to which vegetation prevents erosion.

RATING: - 20

BOUNDARY: Alternative 11
Study Area

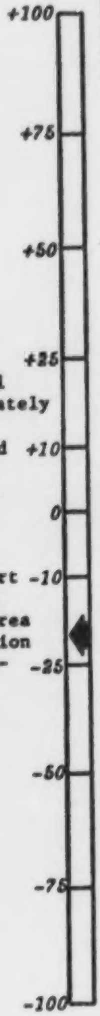
METHOD OF ANALYSIS:

On-site inspection and evaluation of existing conditions.

DISCUSSION:

The majority of the pipe alignments will be within local roadway right-of-ways. Within Central Valley, approximately 2 miles of the alignment must pass through established vegetation. Pipeline construction will cause minor land disruptions during vegetation clearing, trenching, and burying of pipes. The open pasturelands and short segments of woodlots should recover within 6-12 months. Marsh areas may require a longer time.

The last section of the pipe alignment from South Keyport Road to Port Orchard may suffer long-term effects. The steep ravine leading down to the beach is a sensitive area due to the poor soils and slope instability. Construction without proper mitigation methods could affect the vegetation community in that localized area.



Project increases soil stability by introduction of vegetation (planting, seeding, fertilizing).

Project will not induce erosion, i.e., no or negligible effects on soil stability.

Erosion hazard reduced by less severe site characteristics.

Vegetation removal will cause serious erosion and sedimentation because of site characteristics (topography, riparian location).

SOURCE OF REFERENCE:

Earnshaw and Richman, Consulting Botanists

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☒ *Criterion:* Wildlife and Wildlife Habitats

☐ *Sub-Criterion:* ____

RATING: - 15

DEFINITION:

The degree to which the proposed project affects wildlife numbers, complexity and habitat.

BOUNDARY: Alternative 11
Study Area

METHOD OF ANALYSIS:

On-site inspection and evaluation.

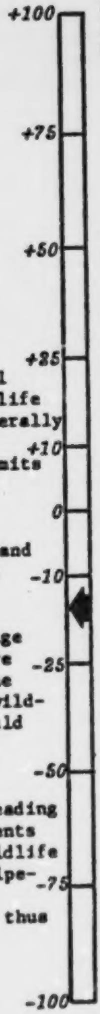
DISCUSSION:

Construction of a new wastewater treatment facility will remove 5-10 acres of wildlife habitat and displace wildlife presently utilizing the area. The proposed site is generally in areas previously disturbed by human actions. The small size and proximity to major thoroughfares also limits the disruption of wildlife and habitats.

All proposed pipeline routes except for small portions north of Brownsville will be within road right-of-ways and should cause negligible impact to wildlife and habitats in adjacent areas.

Construction within the Steel Creek (North Fork) drainage will cause a temporary disruption of habitat. Sensitive areas are the freshwater marsh and swamp adjacent to the treatment plant site. These areas provide a seasonal wildlife habitat. Disruption or reduction of the marsh could lead to a reduction in wildlife associated with this ecosystem.

The construction route of the final pipeline segment leading to the marine outfall will diverge from the road easements and traverse a wooded area to reach the shoreline. Wildlife will be temporarily disrupted during this segment of pipeline construction. The ravine descending to the Port Orchard outfall is unstable with sparse vegetation and thus



+100: Significantly improves wildlife habitats and wildlife number.

+50: Increased wildlife numbers provide more "niches".

+25: Improves or expands wildlife habitat in localities.

0: No changes reflected within system.

-25: Degrades or reduces wildlife habitat in localities.

-50: Decreases wildlife numbers or leads to unstable population.

-100: Significantly degrades wildlife habitats and reduces wildlife number and complexity.

SOURCE OF REFERENCE:

E. Chan, Environmental Analyst

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represents the disturbance of only a marginal wildlife habitat.

Operation of facility or pipelines will not affect terrestrial wildlife. Relocation of population near available sewer lines will disturb, if not eliminate, most wildlife. Since it is assumed that population growth in the Study Area will occur with or without the project and that presently built-up areas would not increase substantially in density, this increase in population, wherever it occurs, would disturb wildlife for a negligible impact difference between project and no-project.

SES Project No. ____

Socio-Economic Systems
INCORPORATED

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☒ *Criterion:* Rare and Endangered Species

☐ *Sub-Criterion:*

DEFINITION:

The degree to which the proposed project affects the viability of habitat for the rare or endangered species.

ASSESSED BUT NOT RATED

BOUNDARY: Alternative 11

METHOD OF ANALYSIS:

Evaluation of existing information

DISCUSSION:

No rare or endangered plant species will be affected within the study area. Of the rare mammals, the sea otter will not be affected. The mountain lion and fisher which might occur in the area and which are wide-ranging animals, may temporarily be disturbed by construction activities and perhaps slight loss in habitat. The western gray squirrel appears in the oak-prairie association and will probably not be affected by the projects.

No long-range negative impacts are associated directly with the project itself.

SOURCE OF REFERENCE: E. Chan, Environmental Analyst
References 19 and 20

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☐ *Criterion:* Freshwater Ecology

☒ *Sub-Criterion:* Clear Creek

DEFINITION:

The degree to which the proposed project affects the Riparian or marsh system: shore vegetation, aquatic habitat and aquatic productivity.

RATING: 0

+100	Significantly improves and promotes stable aquatic habitat and food chain.
+75	
+50	Aquatic productivity and complexity increased within system.
+25	Aquatic habitat improved or stabilized in local areas.
+10	
0	No changes reflected within present conditions.
-10	
-25	Disturbance of nearby watershed area causing deterioration of aquatic habitat in local areas.
-50	Decreases aquatic productivity promoting temporary instability within system.
-75	
-100	Significantly degrades or removes aquatic habitat and productivity.

BOUNDARY: Alternative 11
Clear Creek Pipeline Corridor

METHOD OF ANALYSIS:

On-site inspection

DISCUSSION:

This alternative does not require a pipeline corridor down the lower Clear Creek drainage. Only 2 stream crossings are involved at Bucklin Hill Road and Mountain View Road. Both crossings are on established roads and thus should have negligible impact on the creek.

Upper Clear Creek Valley will retain the present rural environment as designated in the Kitsap County Master Plan.

SOURCE OF REFERENCE: E. Chan, Environmental Analyst, Earnshaw and Richman, Consulting Botanists

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☐ *Criterion:* Freshwater Ecology

☒ *Sub-Criterion:* All freshwater bodies except Clear Creek

DEFINITION:

The degree to which the proposed project affects the Riparian or marsh system: shore vegetation, aquatic habitat and aquatic productivity.

RATING: + 10

+100	Significantly improves and promotes stable aquatic habitat and food chain
+75	
+50	Aquatic productivity and complexity increased within system.
+25	Aquatic habitat improved and stabilized in local areas due to improvement in water quality.
+10	
0	No changes reflected with present conditions.
-10	
-25	Disturbance of nearby watershed area causing deterioration of aquatic habitat in local areas.
-50	Decreases aquatic productivity promoting temporary instability within system.
-75	
-100	Significantly degrades or removes aquatic habitat and productivity.

BOUNDARY: Alternative 11
Island Lake, Barker, Steel and Burke Creeks and all other tributaries

METHOD OF ANALYSIS:

Evaluation of existing conditions

DISCUSSION:

Pipeline construction will cause minor land disruptions during vegetation clearing, trenching and burying of pipes. In limited areas, some erosion may occur which can damage stream beds during the first rainy season. These would be limited impacts and should not last more than 6 months. More significantly, runoff from septic fields and leaking septic tanks will be removed from tributaries to Burke Bay and lower portions of Barker's Creek. This will reduce organic loading and lead to an overall improvement in the freshwater environment. This is most significant during the summer when flows are low and aquatic organisms are more sensitive to external influence.

The crossing of all creeks by new sewage pipelines should be made after the salmonid spawning season and with proper construction techniques; these crossings are expected to affect only very small sections of the streams at present roadway crossings.

The freshwater marsh zone at the head of the North Fork of Steel Creek will be temporarily disrupted. Pipeline construction will remove marsh vegetation and enclose sections of the marsh. This effect is greatly reduced

SOURCE OF REFERENCE:

E. Chan, Environmental Analyst; Earnshaw and Richman, Consulting Botanists

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☐ *Criterion:* Freshwater Ecology

☒ *Sub-Criterion:* All freshwater bodies except Clear Creek

if construction occurs during the late summer when the ground is comparatively drier. The disruption and possible loss of small segments of marsh offsets to a small degree the overall benefit to Freshwater ecosystems accrued by the proposed project.

Socio-Economic Systems
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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Marine Biological Environment

☒ *Criterion:* Benthic Community

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project affects species abundance and distribution within and immediately above the bottom substrate.

RATING: + 25

BOUNDARY: Alternative 11
Port Orchard, Liberty Bay

METHOD OF ANALYSIS:

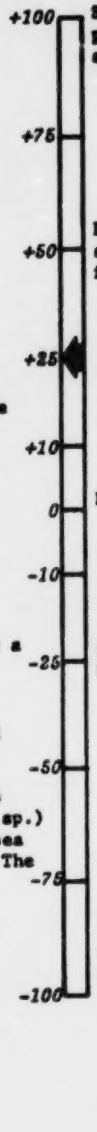
Evaluation of existing and projected conditions.

DISCUSSION:

Water circulation within these areas will provide adequate dilution of wastewater and lead to negligible effects on the benthic community.

Removal of the present wastewater input at Dyes Inlet should provide a marked benefit to the lower strata of the marine environment. The removal of sources of organic pollution, heavy metal contaminants and public health hazards from these restricted inlets should provide an environmental improvement from the present conditions.

Construction and laying of the outfall pipe will have a short-term negative impact on the benthic community. Disruption of the substrate, increase in turbidity, and displacement of marine organisms, particularly clam beds, is unavoidable during construction. Along the eastern shore of the Port Orchard channel may occur some short-term disruption of populations of littleneck, butter, gaper and bentnose clams, mussels and barnacles. Marginally, some pea crabs (Pinnixia sp.) and brittles stars (Ophiodphus sp.) along with some sea lettuce, Laminaria and eel grass will be disturbed. The presence of adjacent benthic communities should lead



+100: Significantly enhances benthic productivity and promotes stable bottom community.

+50: Benthic conditions improved so that quarantine is lifted from shellfish.

0: No or negligible effect.

-25: Short-term degradation of benthic community.

-100: Significantly reduces benthic productivity and degrades bottom environment.

SOURCE OF REFERENCE: E. Chan, Environmental Analyst
K. L. Chew, Marine Biologist
Reference 22

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☐ *Category:* Physical Impacts

☐ *Sub-Category:* Marine Biological Environment

☒ *Criterion:* Benthic Community

☐ *Sub-Criterion:* ____

to substantial repopulation within 2 years.

A raw sewage pipeline would cross Liberty Bay from Lemolo to Keyport. Disruption of local beach and sublittoral communities by underwater pipeline construction would be a short-term impact. Elimination of sessile invertebrates and limited marine flora in the path of construction would be a significant but localized impact.

Adequate dilution and mixing at Port Orchard as calculated in Chapter III should greatly reduce potential adverse impacts of wastewater discharge through the outfall system. A long multiport diffuser system would promote fast mixing. The diluted effluent thus have minor direct impact on the benthic community, although some cumulative effects of effluent material concentrations, as mentioned in Alternative 1, may occur. Avoidance of the central plume area by salmonids and pelagic fish may occur as a reaction to salinity and temperature changes.

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Marine Biological Environment

☒ *Criterion:* Water Column Community

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project affects marine environment within the Water Column Zone (beginning at the benthic community and extending up to two feet below the water surface).

RATING: + 20

BOUNDARY: Alternative 11
Port Orchard, Liberty Bay, Dyes Inlet

METHOD OF ANALYSIS:

Evaluation of existing and projected conditions.

DISCUSSION:

Construction of a pipeline crossing at the mouth of Liberty Bay will have a noticeable short-term impact. Disruption of the substrate would lead to a temporary increase in turbidity at the mouth of the poorly circulating Liberty Bay. The sediment load in the water could have a short-term effect on photosynthetic plants and filter-feeding animals. These effects should be limited to the construction period plus a few months to half-a-year for the bio-regeneration lag time.

Wastewater effluent entering Port Orchard will contribute nutrients such as nitrogen and phosphorus. Within small shallow bays and inlets, nutrient enrichment can trigger algal blooms which block light transmittance to benthic plants, and rob dissolved oxygen from the water when they decompose.

A daily input of 4.8 million gallons of freshwater may have small effects on salinity and temperature directly in the mixing zone. Some mortality will occur as plankton and more sensitive marine organisms become entrained in the freshwater/seawater outfall plume, but this impact is expected to be minor.

SOURCE OF REFERENCE: E. Chan, Environmental Analyst
K. L. Chew, Marine Biologist
Reference 22

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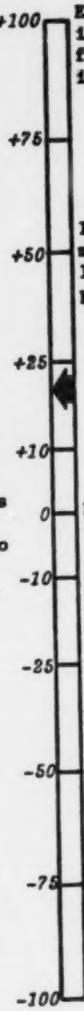


+100: Enhances and maximizes use of intermediate water column for fish and other marine organisms.

+50: Increased productivity in the marine environment through lower food chain due to improved water conditions.

0: No or negligible changes to present system.

-50: Changes in water quality parameters which may affect photosynthesis capability of plants and reduce productivity.

-100: Degrades and severely limits the intermediate water column for fish and other marine organisms.

SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Marine Biological Environment

☒ *Criterion:* Water Column Community

☐ *Sub-Criterion:* ____

Wastewater discharge into open-ended passages with good mixing will minimize these effects or entirely eliminate them.

Elimination of effluent discharge to Dyes Inlet will improve water quality in that area and help to reduce the frequency of algal blooms.

It is thus felt that this net improvement caused by the removal of a poor quality discharge from Dyes Inlet will outweigh the slight, possible negative impacts of a discharge into North Port Orchard channel.

Socio-Economic Systems
INCORPORATED

SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Marine Biological Environment

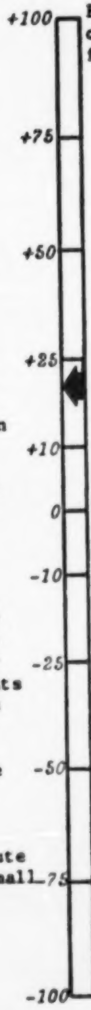
☒ *Criterion:* Surface Community

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project affects marine environment in the Surface Zone (from two feet below water surface to six feet above the water surface).

RATING: + 20



Enhances and maximizes use of surface zone for wildfowl, fish and other organisms.

No or negligible changes to present system.

Introduces excess nutrients leading to excessive enrichment.

Reduces water quality leading to simplification and reduction of marine life.

Degrades and limits severely the surface zone for marine organisms.

BOUNDARY: **Alternative 11**
Liberty Bay, Port Orchard an
Puget Sound

METHOD OF ANALYSIS:

Evaluation of existing and projected conditions.

DISCUSSION:

Removal of the present wastewater input at Dyes Inlet and Poulsbo should provide a marked benefit to the upper strata of the marine environment. The reduction of nutrient loadings would decrease the frequency of algal blooms in these restricted inlets. The cessation of primary sewage flows and septic tank seepages should provide an overall improvement to the present conditions.

Construction of a pipeline crossing at the mouth of Liberty Bay will have a noticeable short-term impact. Disruption of the substrate would lead to a temporary increase in turbidity at the mouth of the poorly circulating Liberty Bay. The sediment load in the water could have a short-term effect on photosynthetic plants and filter-feeding animals. Liberty Bay normally has high algal biomass in the upper layers in the spring runoff season. The shallow Bay depths also sustain large shellfish populations. These effects should be limited to the construction period plus a few months to half-a-year for the bio-regeneration lag time.

Wastewater effluent entering local areas can contribute nutrients such as nitrogen and phosphorus. Within small

SOURCE OF REFERENCE: E. Chan, Environmental Analyst
K. L. Chew, Marine Biologist
Reference 22

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☐ *Category:* Physical Impacts

☐ *Sub-Category:* Marine Biological Environment

☐ *Criterion:* Surface Community

☐ *Sub-Criterion:* ____

shallow bays and inlets, nutrient enrichment can trigger algal blooms which block light transmittance to benthic plants, and rob dissolved oxygen from the water when they decompose.

Adequate mixing of effluent through a well-designed outfall will greatly dilute these effects, especially in areas of good circulation.

SES Project No. ____

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☐ *Category:* Physical Impacts

☐ *Sub-Category:* Soils

☒ *Criterion:* Long-Term Soil Fertility

☐ *Sub-Criterion:* ____

DEFINITION:

The extent of change in yield of native and/or cropped vegetation brought about by the proposed alternative.

RATING: 0

BOUNDARY: Alternative 11
Portion of Kitsap County within Study Area

METHOD OF ANALYSIS:

Examination of soil and geologic reports prepared by the USDA Soil Conservation Service and the State of Washington

DISCUSSION:

Extent of change of yield is estimated from a series of existing soil-vegetative associations, climatic conditions and the available information on effects of increased irrigation, fertilization and toxic element additions as a result of effluent discharges upon soil surfaces. Disruptions in soil properties along pipeline routes are assumed to involve the destruction of soil A and B horizons and their replacement with mineral aggregates of low fertility; however, these effects are minor and generally involve road right-of-ways.

+100	Yield of vegetation is increased by more than 50 percent.
+75	Yield of vegetation is increased by 30 percent.
+50	Yield of vegetation is increased by 20 percent.
+25	Yield of vegetation is increased by 10 percent.
+10	
◀ 0	Soil Properties Remain Unchanged.
-10	
-25	Yield of vegetation is decreased by 10 percent.
-50	Yield of vegetation is decreased by 20 percent.
-75	Yield of vegetation is decreased by 30 percent.
-100	Yield of vegetation is decreased by more than 50 percent.

SOURCE OF REFERENCE: B. Sheikh, Ph. D., Soil Scientist;
References 6 and 7

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☐ *Criterion:* Surface Water

☒ *Sub-Criterion:* Clear Creek

DEFINITION:

The degree to which the proposed project affects ambient surface water quality.

RATING: + 50

+100	Substantially upgrades presently degraded stream to meet standards throughout its length.
+75	
+50	Upgrades stream to meet water quality standards in selected reaches.
+25	Upgrades selected water quality indicators in selected reaches.
+10	
0	No or negligible effect.
-10	
-25	
-50	Degrades selected reaches of stream.
-75	
-100	Substantially degrades a stream that presently meets the standards throughout its length.

BOUNDARY: Alternative 11
Clear Creek

METHOD OF ANALYSIS:
Delineate proposed sewered area within drainage basin, especially where septic tank failures have occurred, and estimate the reduced waste loading to the stream.

DISCUSSION:

Bacteriological standards in the lower reaches of Clear Creek are violated 90 percent of the time. Installation of sewers, although it may cause some temporary construction related degradation, will improve water quality over the long-term after presently contaminated groundwater and construction related disturbances have been flushed out. Improvement will be confined to the lower reaches, where the urban concentration is located. Although upper Clear Creek Valley is sparsely populated, runoff and seepage from those residences could affect water quality. The proposed system would in no way protect water quality or improve it in that area. Due to a lack of a data base for upper Clear Creek, a rating of + 50 is appropriate.

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Engineer; Reference 1 ; State Health Department Data

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☐ *Criterion:* Surface Water

☒ *Sub-Criterion:* Burkes Creek

DEFINITION:

The degree to which the proposed project affects ambient surface water quality.

RATING: + 50

+100	Substantially upgrades a presently degraded stream to meet standards throughout its length.
+75	
+50	Upgrades stream to meet water quality standards in selected reaches.
+25	Upgrades selected water quality indicators in selected reaches.
+10	
0	No or negligible effects.
-10	
-25	
-50	Degrades selected reaches of stream.
-75	
-100	Substantially degrades a stream that presently meets the standards throughout its length.

BOUNDARY: Alternative 11
Burkes Creek

METHOD OF ANALYSIS:
Delineate proposed sewered area within drainage basin, especially where septic tank failures have occurred, and estimate the reduced waste loading to the stream.

DISCUSSION:

Bacteriological standards for Burkes Creek are exceeded over 80 percent of the time in the lower reaches. Installation of sewers will improve long-term water quality after the polluted groundwater presently being discharged from failing septic tank drainfields is flushed out. Improvement will be confined to the lower reaches, hence a rating of + 50 is appropriate.

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Engineer; Reference 1 ; State Health Department Data

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☐ *Criterion:* Surface Water

☒ *Sub-Criterion:* All streams other than Clear Creek and Burkes Creek

DEFINITION:

The degree to which the proposed project affects ambient surface water quality.

RATING: + 40

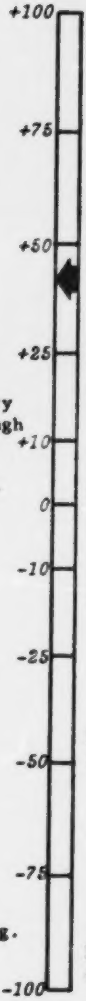
BOUNDARY: Alternative 11
All streams other than Clear Creek and Burkes Creek

METHOD OF ANALYSIS:

Delineate proposed sewered area within drainage basin, especially where septic tank failures have occurred, and estimate the reduced waste loading to the stream.

DISCUSSION:

There are at least six major septic tank drainfield failure areas located within a number of small tributary streams of Dyes Inlet and Port Orchard channel. Although no water quality data exists for these streams, except for Silverdale Creek, it can be assumed that Class A standards are not being met. The impact of sewage collection will be less than in Clear Creek and Burkes Creek because not all of the other stream basins will be sewered so it can not be assumed that the effect is equally beneficial. A lower positive rating of + 40 has been established.



+100 Substantially upgrades presently degraded streams to meet standards throughout their length.

+50 Upgrades stream to meet water quality standards in selected reaches.

+25 Upgrades selected water quality indicators in selected reaches.

0 No or neglegible effect.

-50 Degrades selected reaches of selected streams.

-100 Degrades all streams throughout their length.

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Eng.
Reference 1 ; State Health Department Data

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☐ *Criterion:* Surface Water

☒ *Sub-Criterion:* Lakes

DEFINITION:

The degree to which the proposed project affects ambient surface water quality.

RATING: + 10

BOUNDARY: Alternative 11
Island Lake

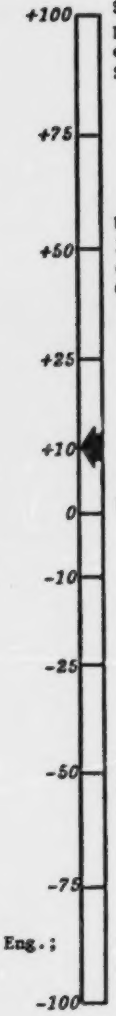
METHOD OF ANALYSIS:

Review Draft Facilities Plan

DISCUSSION:

Alternative plan No. 11 presently does not include an interceptor sewer to the Island Lake area.

An EPA grant condition would ensure that the Trident interceptor had capacity for future connection by Island Lake residents; however, this connection is not part of the proposed project, and after the proposed project is constructed Island Lake might still be polluted. A rating of + 10 is given for the provision of future connections.



+100	Substantially upgrades a presently degraded lake to consistently meet Lake Class Standards.
+50	Upgrades a presently degraded lake and reduces the frequency of violating Lake Class Standards.
0	No or negligible effect.
-50	Degrades a lake so that there is some frequency of violating the standards.
-100	Degrades a lake so that Lake Class Standards are consistently not met.

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Eng.; Reference 1; State Health Department Data

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☐ *Criterion:* Ground Water

☒ *Sub-Criterion:* Quality

DEFINITION:

The degree to which alternatives affect the quality of the principal aquifers in the Study Area.

RATING: + 50

+100	Substantially increases groundwater quality throughout Study Area, all aquifers.
+75	
+50	Groundwater quality increases in localized areas or in selected aquifers.
+25	
+10	
0	No or negligible effect.
-10	
-25	
-50	Groundwater quality reduced in localized areas or selected aquifers.
-75	
-100	Substantially reduces ground water quality throughout Study Area.

BOUNDARY: Alternative 11
Proposed Sewered Area

METHOD OF ANALYSIS:

Evaluation of existing water quality, septic tank failures, location of wells

DISCUSSION:

The installation of sewers will alleviate the recently observed pollution of shallow wells in areas of septic tank malfunctions. This will help in the Silverdale area and particularly the Meadowdale and Brownsville area where dug wells predominate. Pollution of wells would grow worse in the future if septic tank disposal is continued to be used in areas of suburban density land use. Groundwater quality is excellent in all deep aquifers not subject to septic tank infiltration and the installation of sewers will not change this.

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Engineer; References 1 and 5

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☐ *Criterion:* Ground Water

☒ *Sub-Criterion:* Quantity

DEFINITION:

The degree to which the alternatives affect the quantity (availability) of groundwater in the Study Area.

RATING: - 25

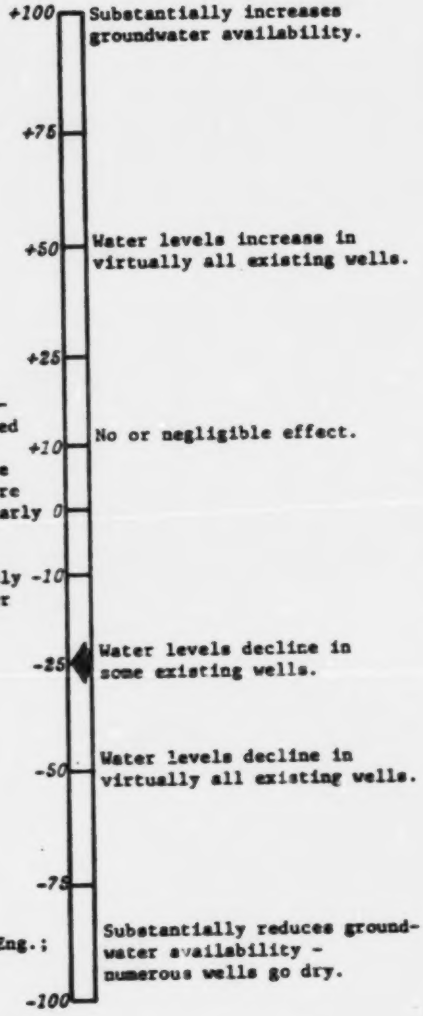
BOUNDARY: Alternative 11
Proposed sewered area

METHOD OF ANALYSIS:

Evaluation of type of wells, depth, aquifer penetrated and proximity to new sewer lines.

DISCUSSION:

It is assumed that clay dams will be required at every manhole along the sewer lines that traverse high groundwater areas to prevent draining of the areas. Restricted use of granular backfill should be required. Without these precautions the rating would be -75 but with these features the rating of -25 was made indicating that there will be localized declines in the water table, particularly where dug wells are utilized, such as Brownsville and Meadowdale. This situation is a certainty because the hydrologic balance of each stream basin will be adversely affected by exporting water extracted from the basin for discharge outside of the basin. Deep aquifers will generally not be affected by the project.


+100
Substantially increases groundwater availability.
+75
+50
Water levels increase in virtually all existing wells.
+25
+10
No or negligible effect.
0
-10
-25
Water levels decline in some existing wells.
-50
Water levels decline in virtually all existing wells.
-75
Substantially reduces groundwater availability - numerous wells go dry.
-100

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Eng.; Reference 5

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SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☒ *Criterion:* Marine Water Quality

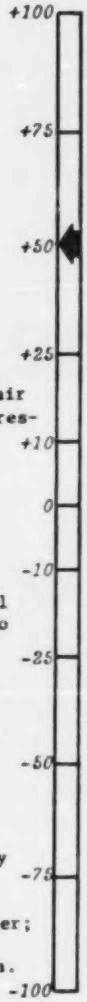
☐ *Sub-Criterion:* ____

DEFINITION:

The effects of secondary level treated wastewaters discharged to marine waters.

RATING: + 50

BOUNDARY: Alternative 11
north Port Orchard channel



Maximum dispersion of effluent to exceed water quality standards; would maintain present water quality.

Minimum dispersion of effluent to meet water quality standards.

Water quality standards violated.

METHOD OF ANALYSIS:

Since the proposed discharge meets water quality standards, calculation is made of degree of mixing and dispersion.

DISCUSSION:

Based upon model studies, discharges to north Port Orchard would receive good mixing and dispersion and fair initial dispersion. For explanation see Chapter 2. Present contamination of Dyes Inlet would be reduced.

It is unlikely that noticeable increases in background concentrations of nutrients would be detected after dispersion of the effluent from this site.

Mixing would be sufficient to prevent toxic concentrations of ammonia at the limits of the mixing zone (plume). Ammonia was assumed eliminated as a potential problem by extending the biological treatment period to nitrify the effluent.

Properly operated secondary level treatment facilities with disinfection facilities can produce an effluent with total coliform levels as low as 23MPN per 100 ml. After dilution, dispersion and die-away, this would be negligible in the receiving water.

Initial dilutions ranging from 50:1 to 200:1 would reduce pollutant concentrations to at least water quality standards levels. Ultimate dilution is roughly estimated at 5000:1.

SOURCE OF REFERENCE: J. A. Davis, Water Quality Engineer; W. O. Maddaus, Water Resources Engineer; Reference 1; University of Washington modeling studies of Study Area.

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RESOURCE IMPACTS

The impacts of the proposed alternative plans upon natural, social and utility resources in the study area are assessed and rated by the following sub-categories:

- Natural Resources
  - Surface Water Resources
    - Potable supply
  - Groundwater
    - Quality of potable supplies
    - Quantity of potable supplies
  - Flora
  - Fauna
    - Terrestrial
    - Marine
- Utilities Service Systems
  - Electrical
  - Gas
  - Water
- Municipal Services
  - Environmental Health
  - Parks and Recreation
  - Flood Control and Storm Drains
  - Sanitary Sewer System
  - Streets and Lighting

SES Project No. 180

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Natural Resources

☐ *Criterion:* Water Resources - Surface

☒ *Sub-Criterion:* Potable supply

DEFINITION: The degree to which the proposed project affects the quality and quantity of potable water obtained from surfaces in the impact area

RATING: +5

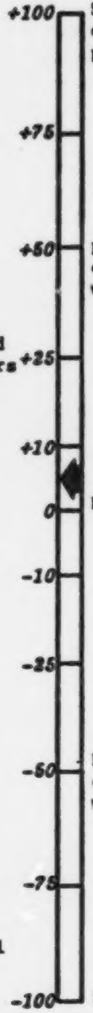
BOUNDARY: Alternative 11
Study area.

METHOD OF ANALYSIS: Staff review of consulting engineer's report.

DISCUSSION: Sub-standard and overtaxed septic tanks and drainfields permit raw sewage to flow into surface waters in the planning area.

The proposed project, by carrying the sewerage to a treatment plant, will reduce or prevent further pollution of surface water supplies and will enhance the quality of surface waters.

The use of surface waters as potable water supply in the Study Area is insignificant.



+100 Significantly enhances the quality and quantity of potable surface water

+50 Enhances the quality and quantity of potable surface water

0 No or negligible effect

-50 Diminishes quality and quantity of potable surface water

-100 Significantly diminishes quality and quantity of potable surface water

SOURCE OF REFERENCE: Amnon Feffer, Senior Environmental Analyst

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SES Project No. 130

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Natural Resources

☐ *Criterion:* Groundwater

☒ *Sub-Criterion:* Quality of potable supplies

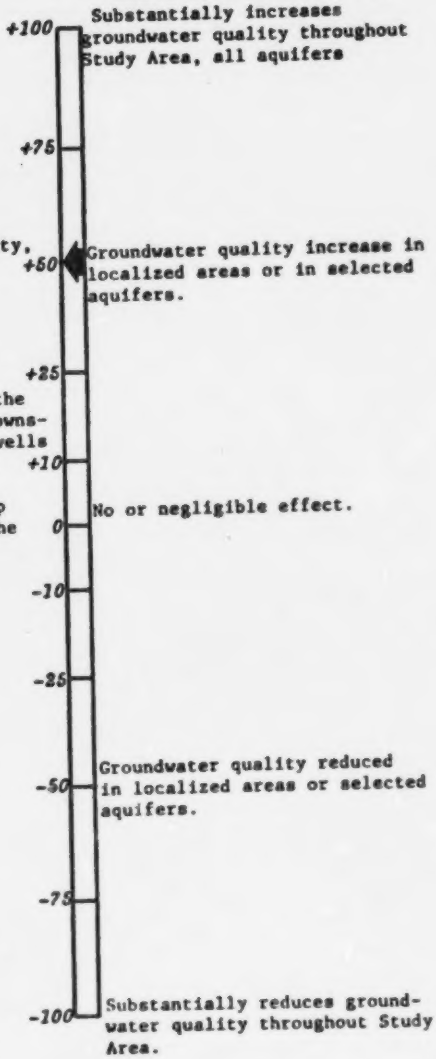
DEFINITION: The degree to which alternatives affect the quality of the principle potable water supplies in the Study Area.

RATING: + 50

BOUNDARY: Alternative 11
Proposed Severed Area

METHOD OF ANALYSIS: Evaluation of existing water quality, septic tank failures, location of wells.

DISCUSSION: The installation of sewers will alleviate the recently observed pollution of shallow wells in areas of septic tank malfunctions. This will help in the Silverdale area and particularly the Meadowdale and Brownsville area where dug wells predominate. Pollution of wells would grow worse in the future if septic tank disposal is continued to be used in areas of surburban density land use. Groundwater quality is excellent in all deep aquifers not subject to septic tank infiltration and the installation of sewers will not change this.



+100 Substantially increases groundwater quality throughout Study Area, all aquifers

+50 Groundwater quality increase in localized areas or in selected aquifers.

0 No or negligible effect.

-50 Groundwater quality reduced in localized areas or selected aquifers.

-100 Substantially reduces groundwater quality throughout Study Area.

SOURCE OF REFERENCE: W.O. Maddaus, Water Resources Engineer; Reference 1 and 5

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SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Natural Resources

☐ *Criterion:* Groundwater

☒ *Sub-Criterion:* Quantity of Potable Supplies

DEFINITION:

The degree to which the alternatives affect the quantity (availability) of potable groundwater in the Study Area.

RATING: - 25

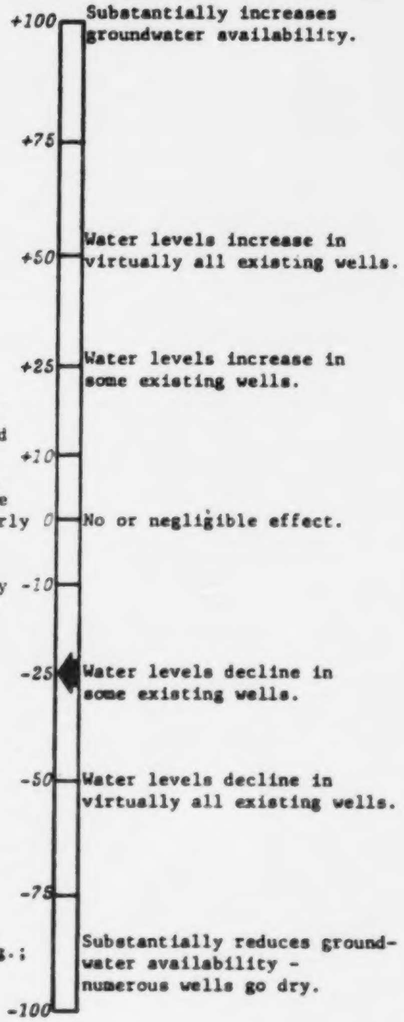
BOUNDARY: Alternative 11
Proposed sewered area

METHOD OF ANALYSIS:

Evaluation of type of wells, depth, aquifer penetrated and proximity to new sewer lines.

DISCUSSION:

It is assumed that clay dams will be required at every manhole along the sewer lines that traverse high groundwater areas to prevent draining of the areas. Restricted use of granular backfill should be required. Without these precautions the rating would be -75 but with these features the rating of -25 was made indicating that there will be localized declines in the water table, particularly where dug wells are utilized, such as Brownsville and Meadowdale. This situation is a certainty because the hydrologic balance of each stream basin will be adversely affected by exporting water extracted from the basin for discharge outside of the basin. Deep aquifers will generally not be affected by the project.



+100	Substantially increases groundwater availability.
+75	
+50	Water levels increase in virtually all existing wells.
+25	Water levels increase in some existing wells.
+10	
0	No or negligible effect.
-10	
-25	Water levels decline in some existing wells.
-50	Water levels decline in virtually all existing wells.
-75	
-100	Substantially reduces groundwater availability - numerous wells go dry.

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Eng.; Reference 5

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SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Natural Resources

☒ *Criterion:* Flora

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project affects vegetation as an economic resource.

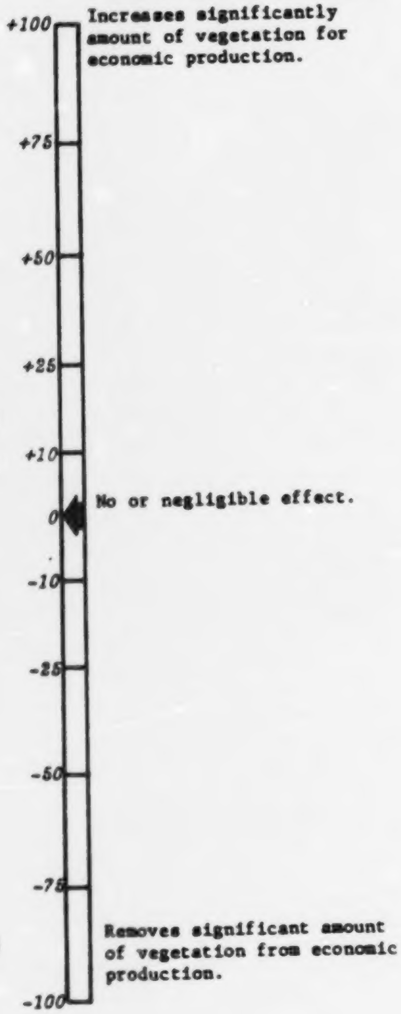
RATING: 0

BOUNDARY: Alternative 11
Study Area

METHOD OF ANALYSIS:

DISCUSSION:

Proposed treatment plant sites and pipeline routes require only small amounts of land area. This limited land utilization should have a minimal effect or no effect at all on any type of vegetation as an economic resource.



SOURCE OF REFERENCE: E. Chan, Environmental Analyst; Earnshaw and Richman, Consulting Botanists

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SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Natural Resources

☐ *Criterion:* Fauna

☒ *Sub-Criterion:* Terrestrial

DEFINITION:

The degree to which the proposed project affects terrestrial game species and abundance.

BOUNDARY: Alternative 11
Study Area

METHOD OF ANALYSIS:

Evaluation of available data

DISCUSSION:

Proposed treatment plant sites and pipeline routes require minimal land utilization, some of which passes through areas of human usage and traffic. The project will probably have a negligible effect on game species and abundance.

Natural population growth in the study area, not associated with the proposed project, will have a negative effect on the abundance of game species.

SOURCE OF REFERENCE: E. Chan, Environmental Analyst

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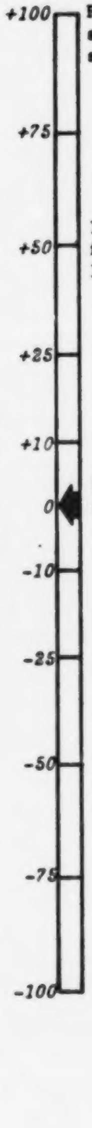
RATING: 0



+100 Provides attractive and stable habitat for many species.

+50 Improvement or extension of favored game habitats in local areas.

0 No or negligible effects on present condition.

-50 Destruction of habitat decreases animal abundance in localized areas.

-100 Significantly decreases types of game species and number through loss of habitat.

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SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Natural Resources

☐ *Criterion:* Fauna

☐ *Sub-Criterion:* Marine

DEFINITION:

The degree to which the proposed project affects commercial and sport fisheries, including effects on mollusc abundance.

RATING: + 20

BOUNDARY: Alternative 11
Port Orchard to Illahee State Park,
Rich Passage and Puget Sound

METHOD OF ANALYSIS:

Evaluation of present condition

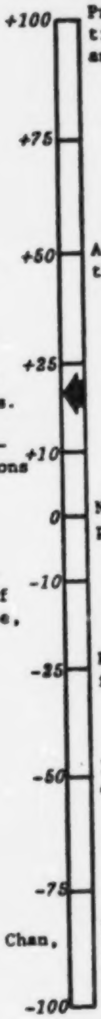
DISCUSSION:

Overall marine biological resources will not be greatly affected in the Poulsbo or Port Madison/Kingston regions.

The Fletcher Bay region which has large harvests of Geoducks is slightly more sensitive. However, large sections of the shorelines in the Study Area are presently legally restricted from commercial harvest.

At the present time, geoduck harvest is greatly influenced by the Washington Fish and Game legal requirement that no harvest occur within 1/4 mile of shore. If this requirement were removed at some time in the future, significant additional stocks would be available.

Overall benefits would be achieved from reduced bacteriological pollution of marine waters.



+100: Promotes and enhances continuation of shellfish beds and marine fish resources.

+50: Attracts and sustains additional fish populations.

0: No or negligible effects on present condition.

-25: Reduction in range of shellfish harvesting.

-50: Impaired productivity and decline in fish populations.

-100: Degradation or deterioration of shellfish beds and significant reduction in marine fish resources.

SOURCE OF REFERENCE: K. L. Chew, Marine Biologist, E. Chan, Environmental Analyst
Reference 5

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SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Utilities Service Systems

☒ *Criterion:* Electrical

☐ *Sub-Criterion:* ____

DEFINITION: The degree to which the proposed project imposes demands on the local electrical power supply system.

RATING: - 1

+100	Continuously supplies significant power.
+75	Supplies power at peak demand times.
+50	Supplies stand-by power.
+25	Supplies emergency power.
+10	
0	No power demand.
-10	Approaches limits of current service capacity.
-25	Requires augmenting existing transmission lines.
-50	Requires enlarging existing transmission facilities
-75	Requires new substation.
-100	Requires increases generating

BOUNDARY: Planning Area, Alternative 11

METHOD OF ANALYSIS: Consultation with personnel of the Kitsap County Public Works Dept., Puget Sound Power and Light Co.

DISCUSSION: The planning area, excluding the Trident base itself, will be serviced by the Puget Sound Power and Light Co., the western division of the Bonneville Power Administration. The U.S. Naval Base at Bangor, where Trident will be located has, and will continue to have its electrical needs served separately by the Bonneville Power and Light Company.

Although the project engineers cannot yet provide an estimate of the power demand of the proposed project, the Puget Sound Power & Light Co. indicates that electrical power resources in the area are adequate to meet the increased demand of Trident related growth, and expressed confidence that the additional demand that this project will impose can be met.

SOURCE OF REFERENCE: Suzanne Yuen, Environmental Analyst
References 1, 35, 36 and 38

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SES Project No. ____

☐ ***Category:*** Resource Impacts

☐ ***Sub-Category:*** Utilities Service Systems

☒ ***Criterion:*** Gas

☐ ***Sub-Criterion:***

DEFINITION: The degree to which the proposed project imposes demands on the local natural gas system.

ASSESSED BUT NOT RATED

BOUNDARY: Kitsap County
Alternative 11

METHOD OF ANALYSIS: Consultation with personnel from the Cascade Natural Gas Co., URS

DISCUSSION: The Cascade Natural Gas Company does not yet supply natural gas to the planning area, but does service the Bremerton and Port Orchard areas which are located just outside of the planning area. The gas company anticipates that there will be ample gas available for all of Kitsap County even with the increased demands due to Trident related growth. Although the service capacity will be more than adequate for future demands there exists the problem of transporting the gas to the area. The Gas Company says that this problem has yet to be worked out.

The proposed project will probably not use any significant amount of gas since electricity will be readily available and the preferred source of power. The project will therefore have only negligible impact on the gas supply system.

SOURCE OF REFERENCE: Suzanne Yuen, Environmental Analyst References 26, 36

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SES Project No. ____

☐ ***Category:*** Resource Impacts

☐ ***Sub-Category:*** Utilities Service System

☑ ***Criterion:*** Water

☐ ***Sub-Criterion:*** ____

DEFINITION: The degree to which the proposed project imposes demands on the local water supply system.

RATING: 0

BOUNDARY: Kitsap County, Alternative 11

METHOD OF ANALYSIS: Consultation with personnel of the Kitsap Cpunty Public Works Dept., URS; Examination of Kitsap County planning policies.

DISCUSSION: Although the project engineers are not yet able to estimate the water needs of the proposed project, demand in this resource is expected to be small. No supply problem is anticipated, as "productive aquifers known to exist....will provide supplies of ground water to meet anticipated 1990 requirements" (Draft Facilities Plan).

The impact on this resource can be considered insignificant.

+100	Continuously supplies potable water.
+75	Continuously supplies non-potable water.
+50	Supplies emergency potable water
+25	Supplies emergency clean, non-potable water.
+10	
0	No water demand.
-10	Approaches limits of current service capacity.
-25	Requires increase in local pressure to increase volume delivered.
-50	Requires installing larger lines.
-75	Requires augmenting storage capacity.
-100	Requires major addition to water distribution system.

SOURCE OF REFERENCE: Suzanne Yuen, , Environmental Analyst
References 1, 35 and 36

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SES Project No. 180

☐ *Category:* Resource Impacts

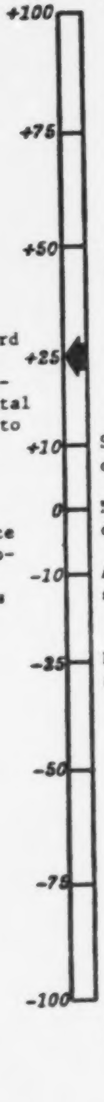
☐ *Sub-Category:* Municipal Services

☒ *Criterion:* Environmental Health

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project imposes demands on the environmental health division of the local health district.

RATING: + 25



+100	Greatly augments service on a continuous basis
+75	
+50	Significantly augments services
+25	
+10	Slightly augments service capacity
0	Neither supplies nor demands services
-10	Approaches limits of service capacity
-25	Requires minor increase in services
-50	
-75	
-100	Destroys existing facilities and places major new demands or services and facilities

BOUNDARY: Kitsap County, Alternative 11

METHOD OF ANALYSIS: Consultation with Kitsap County Department of Public Health Staff, review of Project plans.

DISCUSSION: There is an existing potential health hazard in Kitsap County resulting from the over-loaded condition of septic tanks and the inadequate sewage treatment facilities now in use. The demand for environmental health services, vector control, etc. can be expected to rise as Trident-induced growth, combined with natural population increases and use of inadequate disposal systems impact on the area.

Centralized, effective treatment facilities will reduce sewage-related health hazards and complaints. The proposed project will thus enable the local health district to monitor fecally transmitted infectious agents more efficiently and with greater assurance that the public health is protected.

SOURCE OF REFERENCE: Bill Ulwelling, Environmental Scientist; Reference 38

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Socio-Economic Systems

SES Project No. 180

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Municipal Services

☒ *Criterion:* Parks and Recreation

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project imposes demands on local parks and recreation facilities and services (services include personnel and equipment).

RATING: 0

BOUNDARY: Kitsap County
Alternative 11

METHOD OF ANALYSIS: Review of County recreation resources, proposed project plans.

DISCUSSION: There is currently a deficiency in public recreational areas in the planning area as well as all of Kitsap County which was indicated by the October 1974 ORB study. ORB reported that the present total demand for all recreational areas in Central Kitsap County (in which most of the planning area falls) is 814 acres, calculated by totaling the various demands for each type of recreational area based on the individual standards (No. acres/1000 population) e.g., neighborhood parks (2.25 acres), community parks (2.5 acres), large urban parks without shoreline (1.5 acres), large urban parks with freshwater shoreline (1.5 acres), and large urban parks with saltwater shoreline (2.0 acres). The present supply is 481 acres with only 43 acres actually occuring in the planning area. There are no shoreline parks in the planning area.

The demand for, hence the shortage of recreational areas will be greater when the full impact of Trident related growth is felt. The recreation consultant (ORB) estimates that 1,013 acres of recreational land will be needed at that time, based on an assumed Trident related increase of 24,000 people by 1981.

Alternative 11 is not expected to have any significant impact upon parks of recreation facilities.

SOURCE OF REFERENCE: Suzanne Yuen, Environmental Analyst; Reference 25

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+100	Makes available major new facilities
+75	
+50	Substantially increases available facilities.
+25	
+10	Slightly increases available facilities
0 ◀	Neither supplies nor demands facilities
-10	Approaches limits of current service capacity
-25	Requires minor increase in services
-50	Requires major increase in services
-75	Required increase in services and expansion of facilities
-100	Requires construction of major new facilities.

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SES Project No. 180

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Municipal Services

☒ *Criterion:* Parks and Recreation

☐ *Sub-Criterion:*

CONTINUED:

The shortage of recreational land will not be affected by the proposed project. Very little-more probably no-recreational land will be used by the project itself. The employment potential of the project is small (20-40 employees), and will not significantly affect the population and thus the demand for recreational facilities. To the extent that the proposed project reduces the rush of contamination of local surface and marine waters, it may even beneficially affect this resource slightly.

Regardless of the alternative selected, the net effect with respect to recreational resources in Kitsap County is considered insignificant.

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SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Municipal Services

☑ *Criterion:* Flood Control and Storm Drains

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project imposes demands for drainage and flood control on surrounding properties and local flood control systems.

ASSESSED BUT NOT RATED

BOUNDARY: Study Area
Alternative 11

METHOD OF ANALYSIS:

Consultation with Mr. Bullard, Kitsap County Engineer.

DISCUSSION:

The proposed project alternative will not significantly interfere with normal runoff or affect existing or planned storm drains.

The present and growing hazard of raw sewage from failing septic tanks being washed into storm drains is discussed elsewhere (See "Environmental Health," "Sanitary Sewer System," "Health & Safety").

SOURCE OF REFERENCE: William Ulwelling, Environmental Scientist; Lauryn Jones, Environmental Planner; References 1 and 69

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SES Project No. 180

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Municipal Services

☒ *Criterion:* Sanitary Sewer System

☐ *Sub-Criterion:*

DEFINITION:
The degree to which the proposed project imposes demands on the local sanitary sewer system.

RATING: + 50

+100	Creates a new system with capacity significantly greater than current demand
+75	Creates a new system providing adequate treatment at current demand projections
+50 ◀	Significantly augments existing system on a continuous basis
+25	Augments existing system for overload demand
+10	Slightly upgrades treatment
0	Neither supplies nor demands service
-10	Slightly increases demand for service
-25	Reduces adequacy of existing service
-50	Requires major expansion of exisitng facilities
-75	Requires major expansion of existing facilities and construction of overload capacity facilities
-100	

BOUNDARY: Study Area
Alternative 11

METHOD OF ANALYSIS:

Consultation with Department of Public Works and review of Central Kitsap County Interim Facilities Plan.

DISCUSSION:

The goal of the proposed project is to provide transport and treatment capacity for sewage in an area with seriously inadequate existing capacity, and to prepare for a sharp increase in demand for this service in the near future resulting from the construction of the Trident Support Site.

The Bremerton-Kitsap County Health Department lists numerous areas which have failing drainage, transport, and treatment systems. Approximately 90% of the planning area is classified as having severe limitations for drainage. The existing sewer system in the county, serving Silverdale, is inadequate to meet legal requirements for secondary treatment. The need for an adequate sewer system to serve the growing population of Kitsap County is evident.

Alternative 11 will significantly augment existing sewage disposal capacity. Thus it is given a strongly positive rating, as are the other alternatives.

SOURCE OF REFERENCE: William Ulwelling, Environmental Analyst; Lauryn Jones, Environmental Planner; References 1 and 61.

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SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Municipal Services

☒ *Criterion:* Streets and Lighting

☐ *Sub-Criterion:* ____

DEFINITION: The degree to which the proposed project imposed demands on local street and lighting service.

ASSESSED BUT NOT RATED

BOUNDARY: Study area, Alternative 11

METHOD OF ANALYSIS: Analysis of project plans.

DISCUSSION: The demand for street and lighting service created by the proposed project is expected to be negligible, regardless of the project alternative selected.

Existing sites will be served by existing access roads, which at most may require limited widening or repair.

New sites may require the construction of short access roads and possible lighting, if the sites are not served by existing roads, and if the extensive development required to support Trident-induced growth does not provide the necessary access.

The demand for service to support the small operational staff (20-40 employees) of the facility will not impact measurably on this resource.

In the context of projected growth resulting from the Trident Support Site development, the potential increase in demand on local resource for streets and lighting due to the proposed project is deemed too minor to rate.

SOURCE OF REFERENCE: Amnon Feffer, Senior Analyst; Reference 34

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ECONOMIC IMPACTS

The economic impacts of the proposed alternative plans are assessed and rated in this section. The sub-categories are divided as follows:

- Direct Effects
  - Employment Potential
  - Municipal Service Costs
  - Loans (Bonds) and Subsidies
    - Loans (Bonds)
    - Subsidies
  - Property Tax Base
    - Changes in Property Tax Rates
    - Changes in Property Tax Revenues
- Indirect Effects
  - Property Values
  - Existing Local Businesses
  - New Business Formation
  - New Construction

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SES Project No. 180

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Direct Effects

☐ *Criterion:* Employment Potential

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project affects the employment potential of the local area by creating or eliminating employment.

ASSESSED BUT NOT RATED

BOUNDARY: Kitsap County
Alternative 11

METHOD OF ANALYSIS: Examination of U.S. Dept. of Commerce data.

DISCUSSION: The proposed project will employ between 20 and 40 people, depending on the alternative selected and the operational procedure established. Kitsap County had in 1973, a work force totaling over 36,000. The project will thus have an insignificant effect on the local job market, in its operational phase.

There will be a temporary increase in available employment during the construction phase. The project engineers are not yet able to estimate the size of the increase, nor its duration.

Because the proposed project will not have a meaningful impact on local employment potential regardless of the alternative selected, no rating is given. If the construction force will be large and needed for an extended period, a rating should be given when the facts are established or can be estimated.

While employment opportunities will expand in the study area due to Trident related growth, the proposed project will affect the location of jobs (by attracting residents to its service area) rather than the number of jobs.

SOURCE OF REFERENCE: Lauryn Jones, Environmental Planner

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SES Project No. ____

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Direct Effects

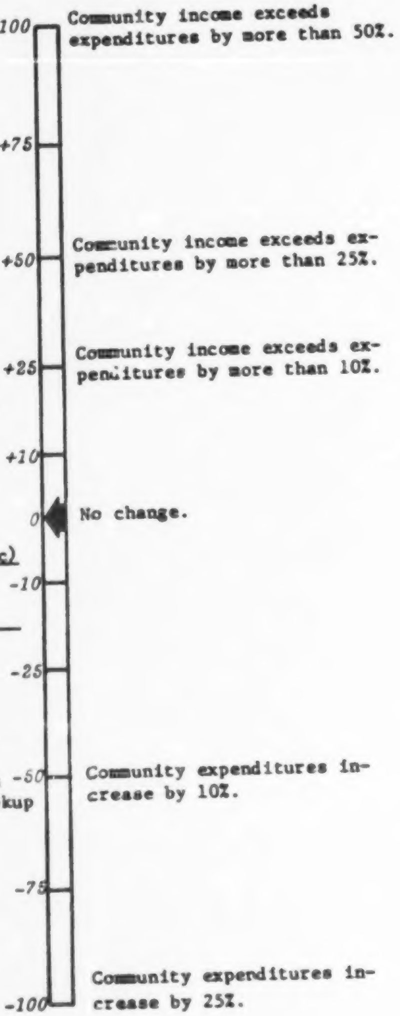
☐ *Criterion:* Municipal Services Costs

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project affects the cost of providing municipal services to the agencies and consumers.

RATING: 0



+100: Community income exceeds expenditures by more than 50%.

+50: Community income exceeds expenditures by more than 25%.

+25: Community income exceeds expenditures by more than 10%.

0: No change.

-50: Community expenditures increase by 10%.

-100: Community expenditures increase by 25%.

BOUNDARY: Central Kitsap County
Alternative 11

METHOD OF ANALYSIS:

See individual criterion sheets.

DISCUSSION:

The following table indicates the estimated annual cash requirements to Kitsap County for project alternative No. 11 and new sewer hookups needed to pay for the cash requirements.

Alternative	Total Annual Cost(a)	Annual New Hookups Needed(b)	Hookup Requirements Beyond Projected Population Increase(c)
11	318,500	192	(28)

(a) From Table III-4

(b) Based on a value of $1,660 per new hookup:

$8/front foot =	$ 640
25% of 2.5¢/SF =	$ 60
$8/mo. x 12 mo. x 20 yrs/2 =	$ 960
	$1,660

(c) Based on planning area projected 20-year population increase of 11,017 (Reference 61) and an index of 1 hookup per 2.5 people (220 hookups per year).

The population of the planning area will increase by 11,017 according to A. D. Little. Using a faction of

SOURCE OF REFERENCE: George Johnson, Economic Analyst, References 56 and 70

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one new sewer hookup per 2.5 people, 4,407 new hookups will be generated, or 220 per year.

There are currently three one-time hookup charges in Central Kitsap County, as follows:

(1) $150 for stub and line to street. This applies only where the county actually installs a side sewer, and is hence not applicable here.

(2) 2.5¢ per square foot area charge for new customers. This applies only where there is currently no adjacent collection system and will be charged to only about 25% of all new hookups. Consequently, this was only given a 25% weight in the average new hookup in the above table. At an average lot size of 80 feet x 120 feet (9,600 square feet), this amounts to $60 per average hookup.

(3) $8 per front foot for all properties. This applies to all new users, since all benefit by sewage systems. At the average lot frontage of 80 feet noted above, this amounts to $640 per hookup.

In addition, current users are charged approximately $8 per month service charge. Assuming a straight-line increase in new hookups to 1995, the average customer will pay exactly 10 years of service charges to 1995, or $960 per average new hookup (1975 dollars).

These charges added together give the $1,660 total revenue per average hookup used in the above table.

This assumes a straight line population increase, which is conservative. Total Kitsap County population is projected to increase by 56,509 by 1995. Of this total, 31,529 (55.8%) will occur in the first five years. Assuming a proportional increase for the planning area, over half the new hookups will occur in the first five years yet will contribute monthly service charges for most of the 20-year period. This will increase average hookup revenues substantially.

Further, this analysis assumes that the entire construction cost to Kitsap County will be financed by a bond issue, which may not necessarily be the case.

The cost of other municipal services necessary to serve the 20-40 facility employees is considered to be negligible and was not considered.

Socio-Economic Systems

SES Project No. ____

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Direct Effects

☐ *Criterion:* Loans (Bonds) and Subsidies

☑ *Sub-Criterion:* Loans (Bonds)

DEFINITION:

The degree to which the funding of the proposed project tends to increase or decrease the financial burdens of the community.

ASSESSED BUT NOT RATED

BOUNDARY: Alternative 11
Kitsap County

METHOD OF ANALYSIS: Consultation with major bank bond specialist and project engineers.

DISCUSSION: Kitsap County's share of financing the proposed project will be borne through the issuance of revenue bonds. There is no legal limit on the amount of revenue bonds that may be issued; however, from a practical standpoint, and in order to make the bonds saleable, the principal amount of bonds so issued should be sufficiently small that the required annual principal and interest payments are less than the revenues available for bond service. Estimated revenues should be in the range of 30 percent to 50 percent in excess of projected requirements to allow for possible errors in forecasts. In addition, a bond reserve fund equal to about one year's bond service requirements is usually created from the initial proceeds of their sale and is maintained over the life of the issue to further secure their payment. Interest rates on revenue bonds are generally one-fourth to one-half percent higher than the rates applicable to comparable general obligation bond issues.

SOURCE OF REFERENCE: Lauryn Jones, Environmental Planner; References 45 and 60.

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Socio-Economic Systems

SES Project No. 180

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Direct Effects

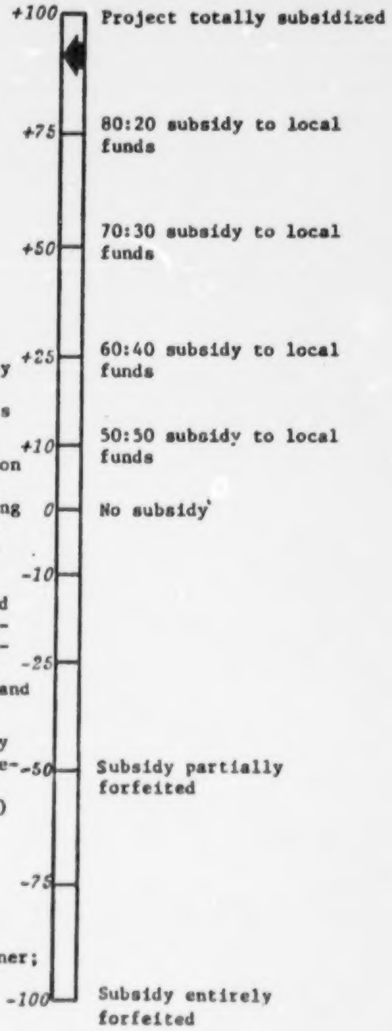
☐ *Criterion:* Loans (Bonds) and Subsidies

☒ *Sub-Criterion:* Subsidies

DEFINITION:

The degree to which the proposed project attracts outside funding.

RATING: + 90


+100
Project totally subsidized
+75
80:20 subsidy to local funds
+50
70:30 subsidy to local funds
+25
60:40 subsidy to local funds
+10
50:50 subsidy to local funds
0
No subsidy
-10
-25
-50
Subsidy partially forfeited
-75
-100
Subsidy entirely forfeited

BOUNDARY: Alternative 11
Kitsap County

METHOD OF ANALYSIS:

Consultation with project engineers and Washington State Department of Ecology.

DISCUSSION:

Ninety percent of the project cost will be subsidized by State and Federal grants. The Federal Government is assuming 75% of the project cost and Washington State is assuming an additional 15% of the cost.

The policy of the Environmental Protection Agency (Region X) regarding Federal funding for wastewater collection, treatment and disposal systems is that 75% of the funding for the needed system is federally provided. Treatment facilities and regional interceptors are generally considered of higher priority for funding.

Presently, local collection systems are not being funded until the State's criteria for priority listings for required local collectors is acceptable to EPA. The facilities to be funded must be sized to be cost-effective, in harmony with the local land use and planning goals, and based upon realistic population projections.

These subsidies and Kitsap County's remaining cost apply to the net project construction cost after 40% reimbursement by the Navy. (Navy reimbursement is of the total project cost before EPA and Washington State subsidies.)

SOURCE OF REFERENCE: Norm Siebertson, Water Operations Branch, EPA, Region X; Lauryn Jones, Environmental Planner; Reference 1; Richard Thiel, Chief, Environmental Impact Section, EPA.

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SES Project No. ____

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Direct Effects

☐ *Criterion:* Property Tax

☐ *Sub-Criterion:* Change in Property Tax Rates

DEFINITION:

The degree to which the proposed project affects property tax rates in the local area.

ASSESSED BUT NOT RATED

BOUNDARY: Kitsap County Tax Districts
Alternative 11

METHOD OF ANALYSIS:

Consultation with County Planning Personnel, County Appraiser and Engineering Consultant.

DISCUSSION:

According to Washington State law, property tax revenue may not be used to pay for sewage district construction or O & M costs. Therefore, Kitsap County property tax rates will be unaffected.

SOURCE OF REFERENCE: George Johnson, Environmental Planning Analyst; References 56 and 70

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Socio-Economic Systems

SES Project No. 180

☐ *Category:* Economic Impacts

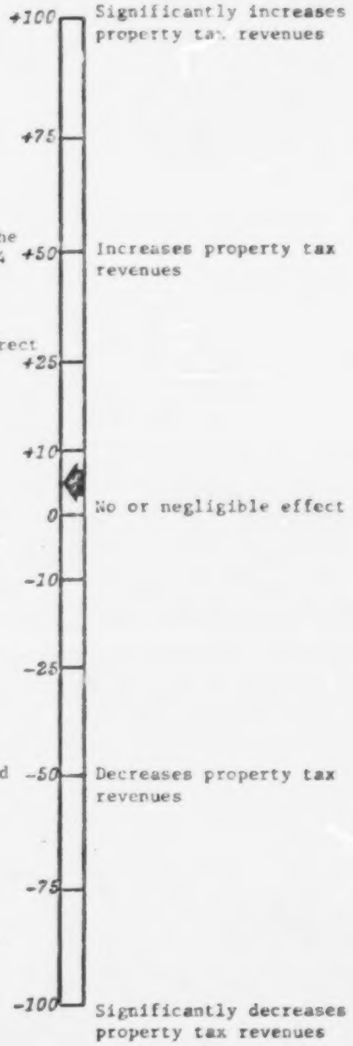
☐ *Sub-Category:* Direct Effects

☐ *Criterion:* Property Tax Base

☒ *Sub-Criterion:* Changes in Property Tax Revenues

DEFINITION: The degree to which the proposed project tends to increase or decrease local property tax revenues in the local area.

RATING: +5


+100
Significantly increases property tax revenues
+75
+50
Increases property tax revenues
+25
+10
0
No or negligible effect
-10
-25
-50
Decreases property tax revenues
-75
-100
Significantly decreases property tax revenues

BOUNDARY: Service area
Alternative 11

METHOD OF ANALYSIS: Consultation with personnel of the Kitsap County Assessors Office and staff review of "1974 Assessed Valuation with Levies and Taxes for 1975"

DISCUSSION: The project will have both direct and indirect impacts on property tax revenues by increasing the property values within the project service area.

Direct Impacts: The amount of property tax revenue collected from a parcel is a function of the parcel's assessed value and the tax rate for that tax district. In Kitsap County the assessment ratio is 100.00 (which means the assessed value is 100% of the market value). Assuming the tax rate remains constant, property values in the planning area will rise even without the project in response to demand for housing caused by Trident. The location of the proposed project will help define the specific areas that will rise in value and will cause a somewhat greater rise in property value in the service area.

The additional increase in property values, hence revenues beyond the rise expected due to Trident-induced demand and which is attributable to the proposed project is estimated at 5%. This is a favorable impact and so rated.

SOURCE OF REFERENCE: Amnon Feffer, Senior Environmental Analyst; Reference 45

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SES Project No. 180

Socio-Economic Systems
INCORPORATED

☐ *Category:* Economic Impacts

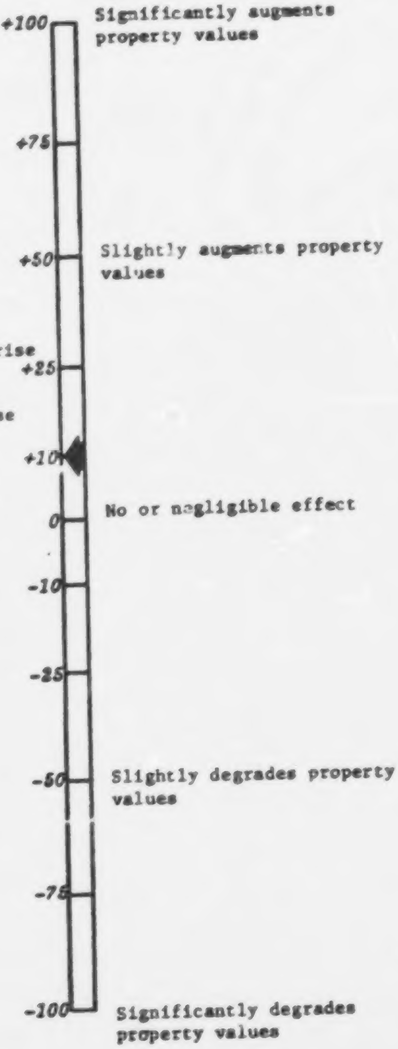
☐ *Sub-Category:* Indirect Effects

☒ *Criterion:* Property Values

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project affects the property value in the local area.

RATING: +10


+100
Significantly augments property values
+75
+50
Slightly augments property values
+25
+10
0
No or negligible effect
-10
-25
-50
Slightly degrades property values
-75
-100
Significantly degrades property values

BOUNDARY: Alternative 11

METHOD OF ANALYSIS: Staff assessment of local economic pressures for residential and commercial areas.

DISCUSSION: Property values in the planning area will rise as a result of the large Trident-induced population influx. The proposed project will serve to increase further the property values in its service area, because the availability of adequate sewerage is limited elsewhere in Central Kitsap County. This additional increase due to sewerage expansion is not likely to be extreme, since factors other than sewerage also enter into the decision to buy, rent or build a home.

SOURCE OF REFERENCE: E. Taft, Building Contractor

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SES Project No. 180

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Indirect Effects

☒ *Criterion:* Existing Local Businesses

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project effects the volume of trade in local businesses

ASSESSED BUT NOT RATED

BOUNDARY: Alternative 11

METHOD OF ANALYSIS: Examination of project alternatives

DISCUSSION: The proposed project will minimally stimulate local buusiness activities, with Trident-induced growth fueling a significant increase in popuulation and hence, a growth in trade for local suppliers of goods and services. The additional increase resulting from this project will be relatively small, both during the construction and the operational phases.

The impact with respect to this criterion will not change regardless of the alternative selected and will be too small to rate.

SOURCE OF REFERENCE: Lauryn Jones, Environmental Planner

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SES Project No. 180

Socio-Economic Systems
INCORPORATED

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Indirect Effects

☒ *Criterion:* New Business Formation

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project stimulates or retards formation of new businesses in the local area

ASSESSED BUT NOT RATED

BOUNDARY: Alternative 11
Kitsap County

METHOD OF ANALYSIS: Projection of demand resulting from the proposed project which may or may not accentuate the need for new services.

DISCUSSION: The project itself is service oriented and does not impose significant service or utility demands on the community. The small number of employees necessary to operate the facility (20-40) will not generate sufficient demand to support the formation of new businesses. New businesses will undoubtedly be established in the County to meet the Trident-induced needs, and will easily absorb the minor increases in demand caused by the proposed project. The location of new business formation will be affected by the project by attracting residents, and hence service businesses, to its service area.

SOURCE OF REFERENCE: Lauryn Jones, Environmental Planner

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SES Project No. 180

☐ *Category:* Economic Impacts

☐ *Sub-Category:* Indirect Effects

☒ *Criterion:* New Construction

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project affects future construction outside of the project area.

ASSESSED BUT
NOT RATED

BOUNDARY: Study area, Alternative 11

METHOD OF ANALYSIS: Assessment of project plans

DISCUSSION: The proposed project is not expected to stimulate new construction in the area beyond the small amount needed to house the 20 to 40 employees of the facility, and even that assumes that all employees will be newcomers to the area. This level of construction activity will be submerged in the much larger effort to house the Trident-induced growth in the area.

The impact with respect to this criterion will be the same regardless of the alternative selected, and is considered too small to rate. The proposed project will permit multiple unit housing development in it's service area, which is not possible presently because of the lack of adequate service capacity to receive the concentrated volumes associated with multiple unit housing. The number of units required will not be affected.

SOURCE OF REFERENCE: Lauryn Jones, Environmental Planner

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SOCIO-CULTURAL IMPACTS

The category of socio-cultural impacts has been subdivided into sub-categories of unique, identifiable subjects as follows:

- Social Impacts
  - Compatibility with Planned Land Use Patterns
  - Health and Safety
  - Population Size and Density
- Cultural and Aesthetic Impacts
  - Archaeological and Historical Sites
  - Entertainment and Recreational Facilities
  - Visual and Aesthetic Environment
- Traffic Effects

Socio-Economic Systems

SES Project No. 180

☐ *Category:* Socio-Cultural Impacts

☐ *Sub-Category:* Social Impacts

☒ *Criterion:* Compatibility with Planned Land Use Patterns

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project conforms to planned land use in the project area.

RATING: + 25

+100	Project of a scale that essentially achieves ultimate planned land use for the regions.
+75	Promotes planned land use development on a regional scale.
+50	
+25	Promotes planned land use in local area.
+10	Site is compatible with planned land use.
0	No or negligible effect on ultimate planned land use.
-10	
-25	Projected land use slightly different from planned use.
-50	Substantially different from planned use.
-75	
-100	Thoroughly incompatible with planned land use.

BOUNDARY: Kitsap County
Alternative 11

METHOD OF ANALYSIS:
Consultation with Kitsap County Planning Department staff; examination of Kitsap County Planning policies.

DISCUSSION:

Alternative 11 is preferable to the other alternatives, which serve Navy Trident development with an interceptor running along Clear Creek. Almost all the land bounding Clear Creek is designated as rural (Kitsap County Comprehensive Plan, Proposed Planning Map). An interceptor traversing this rural area will tend to induce development which might not otherwise occur. In fact, it was in large part due to these concerns, expressed by the public, that this alternative was put forward. Alternative 11's routing of the pipeline from Trident will avoid the Clear Creek area and thus obviate any potential growth-inducing impacts along the creek. There are no foreseeable growth pressures along this alternative pipeline route.

SOURCE OF REFERENCE: Lauryn L. Jones, Environmental and Planning Analyst; References 58 and 71.

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Socio-Economic Systems

SES Project No. 180

☐ *Category:* Socio-Cultural Impacts

☐ *Sub-Category:* Social Impacts

☒ *Criterion:* Health and Safety

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project affects health and safety in the local area and within the project itself.

RATING: +50

BOUNDARY: Kitsap County
Alternative 11

METHOD OF ANALYSIS: Review of existing conditions, project plans, Trident Report, consultation with Bremerton-Kitsap County Health Dept., PACE Corp. Report.

DISCUSSION: The existing health hazard in the area has been documented by the Bremerton-Kitsap County Health Department. Projected growth resulting from the Trident Base work force will overload existing sewage treatment capacity at the existing Navy facility at Bangor and will induce substantial growth in the planning area, increasing the existing hazard.

The hazard results from (a) hydraulic overloading of the existing sewage systems, and (b) the generally poor soil suitability for drainfields in the area. A further complication results from the high groundwater table, which can lead to contamination of subsurface water from failing drainfields. In addition, surface waters also show excessive levels of contaminants, for example at Island Lake, Port of Brownsville, Dyes Inlet, Port Washington Narrows, Clear Creek and Silverdale Creek, among others.

The proposed project will substantially reduce the existing and potential health hazard by reducing pressure on the overloaded systems, thereby reducing the risk of contamination from failing septic tanks and inadequate treatment facilities such as the existing system at Silverdale.

The impact rating is thus significantly positive.

+100	Creates ideal health and safety conditions.
+75	
+50 ◀	Greatly improves health and safety conditions.
+25	Significantly improves health and safety conditions.
+10	Promotes health and safety conditions.
0	No or negligible net effect.
-10	Health and safety conditions barely meet current minimum standards.
-25	
-50	Slightly degrades health and safety conditions.
-75	
-100	Significantly degrades health and safety conditions.

SOURCE OF REFERENCE: Lauryn Jones, Environmental Planner ; References 4 and 42
William Ulwelling, Environmental Scientist

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Socio-Economic Systems

SES Project No. 180

☐ *Category:* Socio-Cultural Impacts

☐ *Sub-Category:* Social Impacts

☒ *Criterion:* Population Size and Density

☐ *Sub-Criterion:*

DEFINITION:

The degree to which the proposed project promotes desired (General Plan, Zoning Laws) local population size and density without overtaxing the local infrastructure.

ASSESSED BUT NOT RATED

BOUNDARY: Kitsap County
Alternative 11

METHOD OF ANALYSIS: Review of "Amendment to Kitsap County Comprehensive Plan," "Planning Policies Outline for the Future Growth of Kitsap County, Washington-- An Element of the Kitsap County Comprehensive Plan," Planning Policies, Project Plan, Staff Analysis.

DISCUSSION: The "Amendment" document referred to above outlines the planning policies with respect to intensity of development of rural, transitional, urban and redevelopment areas. The plan outlines an approach to the management of growth which will encourage higher densities in and around urban centers (urban and transitional areas), while maintaining the rural character of other areas. In addition to preserving existing attractive qualities of rural and semirural areas, the control of urban growth will promote more efficient delivery of public services to the present and expected population.

The proposed project gives county planners the opportunity to channel growth toward selected areas in conformity with local goals. The growth itself has become inevitable as a result of the decision to proceed with the Trident base.

Assuming that access to the sewer lines will only be permitted in designated growth areas, and that the project selected alternative will provide service in those areas, population size and density should conform to planning goals. While local infrastructure will be taxed (and perhaps overtaxed) by expected growth, the proposed project, rather than causing this situation, will be a major component of the effort to enable the infrastructure to cope with the growth.

One characteristic of alternative 11 which makes it preferable to the others is that it does not include the Clear Creek corridor in its pipeline route. This relieves the corridor of development pressure. Population growth in this area, which is generally designated "Rural" in the Kitsap County Proposed Planning Policy Map, is not encouraged by present county policy.

SOURCE OF REFERENCE: Arrie Bachrach, Environmental Analyst

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Socio-Economic Systems

SES Project No. ____

☐ *Category:* Socio-Cultural Impacts

☐ *Sub-Category:* Social Impacts

☒ *Criterion:* Population Size and Density

☐ *Sub-Criterion:* ____

Population size will be minimally increased by the proposed project, regardless of alternative, since it will employ between 20 and 40 people.

Population density will be increased by the proposed project, inducing concentration in those areas served by the facility that will be greater than the more random dispersal that could be expected if no sewage collection service is available in the planning area. This will be compatible with local planning if the service, hence the increase in density, is available in the urban and transitional areas designated for growth, and if actual development is not permitted to violate zoning restrictions affecting density. A small positive rating is therefore given to each alternative. However, until sewered areas are better defined, no rating will be shown.

Socio-Economic Systems **SES Project No.** 180

☐ *Category:* Socio-Cultural

☐ *Sub-Category:* Cultural and Aesthetic

☒ *Criterion:* Archaeological and Historical Sites

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project affects local archaeological and paleontological sites.

RATING: 0

+100
+75
+50
+25
+10
0
-10
-25
-50
-75
-100

+100: Preserves and enhances archaeological and paleontological remains.

0: No or negligible effect on archaeological or paleontological remains.

-100: Destroys paleontological or archaeological remains.

BOUNDARY: Alternative 11
Project planning area

METHOD OF ANALYSIS: Examination of the archaeological reconnaisance report.

DISCUSSION: A literature survey (National Register of Historic Places, Site Survey Records for Kitsap County at the University of Washington) indicated that there were no known sites of archaeological or historical significance within the project planning area. An archaeological survey of the planning area in December, 1974, revealed only one archaeological site, a shell midden near the Brownsville Marina on Burke Bay. The midden has essentially been destroyed by historic and modern activities (e.g., dredging operations, road construction) and the investigating archaeologist has judged that the cultural information coming from further investigation of this site would be of dubious value. The proposed project would therefore have little or no impact upon the midden. No other historical or archaeological sites have been identified in the planning area.

SOURCE OF REFERENCE: Suzanne Yuen, , Environmental Analyst ; Reference 43

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Socio-Economic Systems

SES Project No. ____

☐ *Category:* Socio-Cultural

☐ *Sub-Category:* Cultural and Aesthetic Impacts

☒ *Criterion:* Entertainment and Recreational Facilities

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project supplies or demands entertainment and recreational facilities.

RATING: + 5

BOUNDARY: Kitsap County
Alternative 11

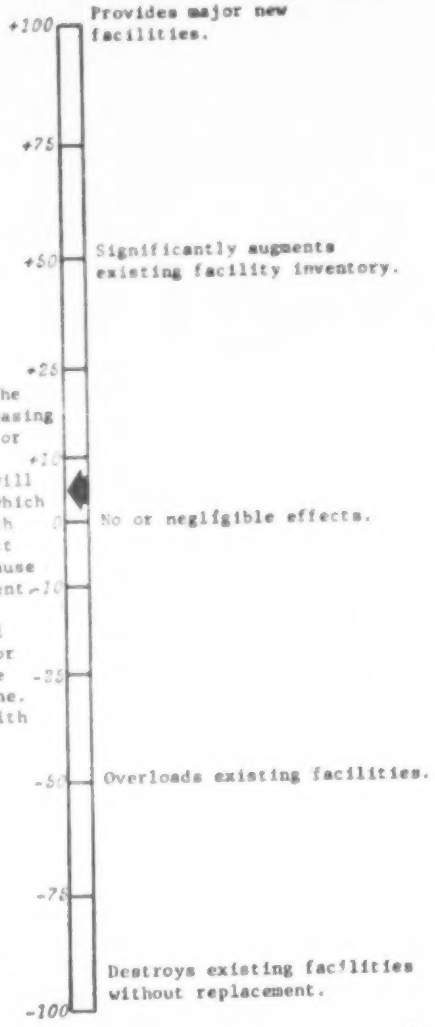
METHOD OF ANALYSIS:

Examination of the alternative plans for the proposed project.

DISCUSSION:

The proposed project will have a beneficial impact on the recreational resources of the area. Outfall sites releasing sewage after primary treatment will either be upgraded or replaced, reducing the level of coastal pollution to acceptable levels. The most significant improvements will be noted in such areas as Liberty Bay and Dyes Inlet, which receives the outfall from the Silverdale plant and which suffers from inadequate flushing. The beneficial impact will result regardless of the alternative selected because no outfall will be permitted after only primary treatment.

The pipeline rights-of-way offer potential recreational resources. Once the pipeline is installed, the corridor may--at the county's discretion--be developed as nature trails, bike trails and recreational access to shoreline. However, these options have not as yet been included with the facilities design.



SOURCE OF REFERENCE: William Ulwelling, Environmental Scientist

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Socio-Economic Systems

SES Project No. 180

☐ *Category:* Socio-Cultural

☐ *Sub-Category:* Cultural and Aesthetic Impacts

☐ *Criterion:* Visual and Aesthetic Environment

☐ *Sub-Criterion:*

DEFINITION:

The degree to which the proposed project affects the public's visual and aesthetic enjoyment of an area.

RATING: - 10

BOUNDARY:
Alternative 11
Sewage treatment facility location
Pipeline routes

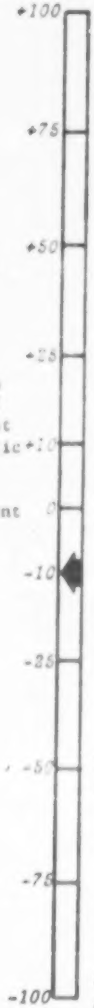
METHOD OF ANALYSIS:

Subjective opinions of project staff who have visitied proposed sites.

DISCUSSION:

The north Brownsville site is well screened from view from adjacent roadways and property. Its location on a major route through the Study Area precludes any use of the site as a "natural or serene" preserve. Its present condition of overgrown farmland contains little aesthetic value.

No aesthetic impact would be felt from pipeline placement along existing roads.



+100	Substantially improves aesthetic qualities and provides for future.
+50	Promotes aesthetic quality in localized areas.
0	No changes in present aesthetic quality.
-50	Degrades aesthetic qualities in some local areas
-100	Substantially degrades aesthetic qualities.

SOURCE OF REFERENCE: Project staff

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Socio-Economic Systems
INCORPORATED

SES Project No. 180

☐ *Category:* Socio-Cultural

☒ *Sub-Category:* Traffic Effects

☐ *Criterion:*

☐ *Sub-Criterion:*

DEFINITION: The degree to which the proposed project impacts traffic flows and patterns.

ASSESSED BUT NOT RATED

BOUNDARY: Study Area
Alternative 11

METHOD OF ANALYSIS: Consultation with Traffic Engineer and the Engineering Consultant

DISCUSSION: The loading imposed by project-related traffic generated by the approximately 20-40 employees of a sewage treatment facility is negligible when compared with baseline traffic loads. Additionally, these 20-40 employees will work in three shifts.

In the context of projected growth resulting from the Trident Support Site development, traffic increases due to the proposed project are deemed too minor too rate.

Preliminary estimates of construction related traffic, provided by the engineering consultant are intended to show an order of magnitude. For an initial 12 to 18 month period, approximately 12 truck trips/day can be expected, for the final 2-3 month period, an estimated 18 truck trips/day can be expected. The construction crew will add approximately 22 trips/day. In the event of an urgent request to reduce the construction period, related traffic can be expected to rise to 21/day (12 to 18 months), 20/day (2-3 months), 44/day (work force).

SOURCE OF REFERENCE: William Ulwelling, Environmental Analyst.

EIR Form #1016/
Copyright 1973

V ADVERSE IMPACTS & MITIGATIVE MEASURES

Silverdale VILLAGE SHOPPING CENTER
IGA
FOODLINER

CHAPTER V

ADVERSE IMPACTS AND MITIGATIVE MEASURES

This chapter presents adverse impacts and mitigative measures for the proposed wastewater facilities plan.

Impacts which received ratings between -10 and +10 are considered to be of negligible importance. In some instances these impacts would have rated higher scores except that mitigative measures were automatically built into the system. As an example, odors from a poorly operated sewage treatment facility could be very unpleasant and far ranging. It must be assumed that the facility would be designed, constructed and operated with reasonable care and diligence. Under such conditions, odors are very rarely a problem.

This chapter specifically identifies substantially negative environmental, social and cultural impacts and states special mitigative measures that should be taken to lessen those impacts. The discussion is separated into categories of physical, resource, economic and sociocultural impacts. Only impacts with ratings lower than -10 are considered sufficiently substantial to warrant a discussion.

PHYSICAL IMPACT MITIGATION

The following are physical impacts identified as being of substantially negative nature within the study area and/or as a result of implementation of project alternatives.

Socio-Economic Systems
INCORPORATED

SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☐ *Criterion:* Vegetation Communities

☒ *Sub-Criterion:* Overall Study Area less Clear Creek

DEFINITION:

The degree to which the proposed project affects vegetation as a soil stabilizer. Site characteristics (topography, riparian location) determine degree to which vegetation prevents erosion.

RATING: - 20

BOUNDARY: Alternative 11
Study Area

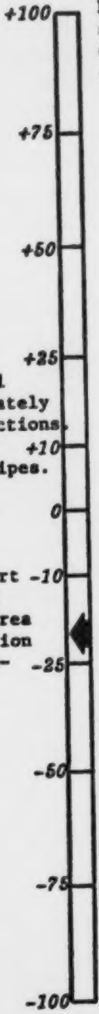
METHOD OF ANALYSIS:

On-site inspection and evaluation of existing conditions.

DISCUSSION:

The majority of the pipe alignments will be within local roadway right-of-ways. Within Central Valley, approximately 2 miles of the alignment must pass through vegetated sections. Pipeline construction will cause minor land disruptions during vegetation clearing, trenching, and burying of pipes. The open pasturelands and short segments of woodlots should recover within 6-12 months. Marsh areas may require a longer time.

The last section of the pipe alignment from South Keyport Road to Port Orchard may suffer long-term effects. The steep ravine leading down to the beach is a sensitive area due to the poor soils and slope instability. Construction without proper mitigation methods could affect the vegetation community in that localized area.



+100: Project increases soil stability by introduction of vegetation (planting, seeding, fertilizing).

0: Project will not induce erosion, i.e., no or negligible effects on soil stability.

-50: Erosion hazard reduced by less severe site characteristics.

-100: Vegetation removal will cause serious erosion and sedimentation because of site characteristics (topography, riparian location).

SOURCE OF REFERENCE:

Earnshaw and Richman, Consulting Botanists

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Socio-Economic Systems
INCORPORATED

SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Terrestrial Environment

☒ *Criterion:* Wildlife and Wildlife Habitats

☐ *Sub-Criterion:* ____

DEFINITION:

The degree to which the proposed project affects wildlife numbers, complexity and habitat.

RATING: - 15

+100	Significantly improves wildlife habitats and wildlife number.
+75	
+50	Increased wildlife numbers provide more "niches".
+25	Improves or expands wildlife habitat in localities.
+10	
0	No changes reflected within system.
-10	
-25	Degrades or reduces wildlife habitat in localities.
-50	Decreases wildlife numbers or leads to unstable population.
-75	
-100	Significantly degrades wildlife habitats and reduces wildlife number and complexity.

BOUNDARY: Alternative 11
Study Area

METHOD OF ANALYSIS:

On-site inspection and evaluation.

DISCUSSION:

Construction of a new wastewater treatment facility will remove 5-10 acres of wildlife habitat and displace wildlife presently utilizing the area. The proposed site is generally in areas previously disturbed by human actions. The small size and proximity to major thoroughfares also limits the disruption of wildlife and habitats.

All proposed pipeline routes except for small portions north of Brownsville will be within road right-of-ways and should cause negligible impact to wildlife and habitats in adjacent areas.

Construction within the Steel Creek (North Fork) drainage will cause a temporary disruption of habitat. Sensitive areas are the freshwater marsh and swamp adjacent to the treatment plant site. These areas provide a seasonal wildlife habitat. Disruption or reduction of the marsh could lead to a reduction in wildlife associated with this ecosystem.

The construction route of the final pipeline segment leading to the marine outfall will diverge from the road easements and traverse a wooded area to reach the shoreline. Wildlife will be temporarily disrupted during this segment of pipeline construction. The ravine descending to the Port Orchard outfall is unstable with sparse vegetation and thus

SOURCE OF REFERENCE:

E. Chan, Environmental Analyst

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represents the disturbance of only a marginal wildlife habitat.

Operation of facility or pipelines will not affect terrestrial wildlife. Relocation of population near available sewer lines will disturb, if not eliminate, most wildlife. Since it is assumed that population growth in the Study Area will occur with or without the project and that presently built-up areas would not increase substantially in density, this increase in population, wherever it occurs, would disturb wildlife for a negligible impact difference between project and no-project.

Mitigative Measures to Protect Vegetation and Wildlife Habitats

The destruction of vegetation along the pipeline route is unavoidable. The severity of the effects of this destruction and its duration can be shortened. Appropriate measures would include reseeding and replanting disturbed areas with native vegetation and short-term stabilization of the soil surface with organic mulches. Straw has been successfully used as a mulch and soil stabilizer for sloping embankments along new highway construction.

A chipper should be used to shred the brush and slash, with the resulting mulch being used with the soil to fill in the trench. Besides serving to check erosion, this activity would facilitate reseeding by native vegetation and reduce the availability of dry brush feed for wild fires.

Seeding and fertilizing should be carried out, particularly in pasture and meadow areas where natural reseeding would be expected to be difficult. Additionally, reseeding would assure the growth of desired plant species. Fertilization within forested areas would also enhance revegetation of bare areas.

Separate storage during construction and replacement of the upper natural soil layers over the backfill material would provide an improved environment for the growth of new plants.

These mitigative measures should be applied at all locations where the sewers would deviate from roadside cuts.

Secondary effects due to population growth can be minimized if the County officials implement measures to protect the rural/agricultural planning area designation north of Bucklin Hill Road.

The facilities planner is designing a tunnel for the placement of this outfall through the shoreline ridge and steep bank. This will greatly alleviate the problem of trenching through unstable soil on a steep bank.

Socio-Economic Systems

SES Project No. ____

☐ *Category:* Physical Impacts

☐ *Sub-Category:* Water Quality

☐ *Criterion:* Ground Water

☒ *Sub-Criterion:* Quantity

DEFINITION:

The degree to which the alternatives affect the quantity (availability) of groundwater in the Study Area.

RATING: - 25

BOUNDARY: Alternative 11
Proposed sewered area

METHOD OF ANALYSIS:

Evaluation of type of wells, depth, aquifer penetrated and proximity to new sewer lines.

DISCUSSION:

It is assumed that clay dams will be required at every manhole along the sewer lines that traverse high groundwater areas to prevent draining of the areas. Restricted use of granular backfill should be required. Without these precautions the rating would be -75 but with these features the rating of -25 was made indicating that there will be localized declines in the water table, particularly where dug wells are utilized, such as Brownsville and Meadowdale. This situation is a certainty because the hydrologic balance of each stream basin will be adversely affected by exporting water extracted from the basin for discharge outside of the basin. Deep aquifers will generally not be affected by the project.

+100	Substantially increases groundwater availability.
+75	
+50	Water levels increase in virtually all existing wells.
+25	
+10	No or negligible effect.
0	
-10	
-25 ◀	Water levels decline in some existing wells.
-50	Water levels decline in virtually all existing wells.
-75	
-100	Substantially reduces groundwater availability - numerous wells go dry.

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Eng.; Reference 5

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Mitigative Measures to Protect Groundwater Quantity

The reduction of local availability of groundwater from the uppermost water bearing strata will come about primarily due to the placement of sewerage systems. Groundwater tables above the elevations of gravity flow sewers will cause the infiltration of groundwater into the sewers. This effect is somewhat minor and can be greatly minimized by using neoprene or plastic gaskets or seals at sewer pipe joints. Of greater impact would be the drainage of local groundwaters along the bed of the sewer pipe. The beds upon which sewer pipe are placed and the backfill material are usually more porous than surrounding undisturbed soils and will act as drains. All available groundwaters in the vicinity of such drains and above the sewer pipe elevation would be drained to the sewer pipe elevations. This impact can be very substantially mitigated by the careful placement of impermeable clay dams at regular intervals along the sewers. These dams would act as a stop to the drainage of groundwaters.

Water levels in shallow dug wells would still decline and may decline in slightly deeper drilled wells in spite of these measures. The current practice of using septic tank disposal fields in most of the study area provides a natural, albeit impure, recharge to the local groundwater. The proposed plans to extract waters from the ground, use them and then transport them out of the local recharge areas will reduce the natural recharge but gain improved water quality.

Mitigative Measures to Protect Island Lake

The proposed plan has no impact upon lake waters in the study area and receives an appropriate rating of zero. However, all other alternatives under consideration have a provision to sewer the residences, existing and proposed, in the vicinity of Island Lake, with a connection to the Clear Creek interceptor. These alternatives would substantially reduce a documented bacteriological health hazard in Island Lake.

Due to the relocation of the Trident Support Site interceptor sewer onto State Highway 303, the interceptor sewer serving Island Lake was dropped from consideration. It is recommended that an obvious, existing bacterial pollution problem be addressed in the proposed plan through the inclusion of an interceptor sewer from the existing residences at Island Lake to the proposed interceptor route along State Highway 303.

Mitigative Measures to Protect Marine Water Quality

It is expected that with typical municipal wastewaters and normal, uneventful operation of the proposed wastewater treatment facility, the impacts upon marine water quality from treated effluent discharge to an appropriate site would be minimal. Proper facility design will result in appropriate pollutant reductions and minimize the potential for mishaps, and operation of the facility by properly trained personnel will further safeguard the environment. However, at this time the facility planner recognizes that the wastewater to be discharged from the Trident Support Site has poorly defined characteristics. Although the U.S. Navy is obligated to provide appropriate wastewater pretreatment before discharging to the regional system, the facility planner felt that the following recommendations would help ensure a consistently high quality effluent:

1. Kitsap County should stipulate the maximum levels of pollutants it will accept from the U.S. Navy as part of the contracts for sewerage services. Table III-2 showed recommendations for pollutants that had been anticipated at this time. The list would be modified when appropriate.

2. The Trident Support Site effluent should be monitored not only for the listed pollutants but also for pH, temperature, oil and grease, heavy metals and cyanide. A monitoring program would help in identifying problems before they become substantial and would serve as a record of the presence or absence of pollutants in the event the effects of treated effluent discharge upon the environment are questioned.

As a further precaution for the protection of marine water quality it is recommended that a 6-month study be undertaken at the proposed North Port Orchard disposal site. During this study continuously recording current meters would verify the direction, strength and frequency of currents at the disposal site. Additional drogue or drifter studies and measurement of seasonal changes in water column density structure are recommended. It has already been concluded that the North Port Orchard site is acceptable. These studies would serve to further define the local marine condition so that an outfall and diffuser could be designed to absolutely minimize any environmental impact.

RESOURCE IMPACT MITIGATION

Mitigative Measures to Protect Quantity of Potable Water Supplies

The preceding discussion on groundwater is applicable to this topic.

ECONOMIC IMPACT MITIGATION

There are no substantial negative economic impacts associated with the implementation of the proposed facilities plan.

SOCIO-CULTURAL IMPACT MITIGATION

There are no substantial negative social or cultural impacts associated with the implementation of the proposed facilities plan.

IMPLEMENTATION OF MITIGATIVE MEASURES

Table V-1 lists the special mitigative measures recommended in this chapter and provides the responses from Kitsap County and the EPA construction grants division on recommended implementation of those measures. In general, the implementation of most of the measures will become mandated by the acceptance by Kitsap County of a construction grant from EPA.

The County currently expresses intent to maintain zoning designations within the study area. It cannot constrain future administrations from changing this zoning.

The contract between the U.S. Navy and Kitsap County for the treatment of Trident Support Site wastes will stipulate maximum allowable levels of pollutants.

Socio-Economic Systems

SES Project No. ____

☐ *Category:* Resource Impacts

☐ *Sub-Category:* Natural Resources

☐ *Criterion:* Groundwater

☒ *Sub-Criterion:* Quantity of Potable Supplies

DEFINITION:

The degree to which the alternatives affect the quantity (availability) of potable groundwater in the Study Area.

RATING: - 25

BOUNDARY: Alternative 11
Proposed sewered area

METHOD OF ANALYSIS:

Evaluation of type of wells, depth, aquifer penetrated and proximity to new sewer lines.

DISCUSSION:

It is assumed that clay dams will be required at every manhole along the sewer lines that traverse high groundwater areas to prevent draining of the areas. Restricted use of granular backfill should be required. Without these precautions the rating would be -75 but with these features the rating of -25 was made indicating that there will be localized declines in the water table, particularly where dug wells are utilized, such as Brownsville and Meadowdale. This situation is a certainty because the hydrologic balance of each stream basin will be adversely affected by exporting water extracted from the basin for discharge outside of the basin. Deep aquifers will generally not be affected by the project.

+100	Substantially increases groundwater availability.
+75	
+50	Water levels increase in virtually all existing wells.
+25	Water levels increase in some existing wells.
+10	
0	No or negligible effect.
-10	
-25 ◀	Water levels decline in some existing wells.
-50	Water levels decline in virtually all existing wells.
-75	
	Substantially reduces groundwater availability - numerous wells go dry.
-100	

SOURCE OF REFERENCE: W. O. Maddaus, Water Resources Eng.; Reference 5

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Table V-1. EPA-RECOMMENDED IMPLEMENTATION OF MITIGATIVE MEASURES

Subject	EPA construction grants response	Kitsap County response	EPA recommendation
Vegetation and wildlife habitat	Agree to grant condition	Agree to grant condition	Use grant condition
Secondary effects of population growth	Not appropriate for grant condition	No assurance beyond existing zoning is legally binding or practical	Citizenry should be actively involved in land use planning
Preventing drainage of groundwaters	Agree to grant condition if desired by grantee	Agree to grant condition	Use grant condition
Island Lake pollution problems	Should be covered in facility plan	Sewering of Island Lake planned later when needs are better defined	Use grant conditions to ensure that Navy interceptor has capacity for future Island Lake connection
Limits on Navy waste contribution	Not appropriate for grant condition	Contract negotiation with Navy will address waste limitations	Limit waste strength in contract between Navy and County
Monitoring of Trident wastes	Agree to grant conditions	Could require in Navy contract; agree to grant condition	Use grant condition
Predesign Port Orchard marine survey	Agree to grant condition	Considered reasonable	Use grant condition

VI IRREVERSIBLE & IRRETRIEVABLE OURCE COMMITMENTS

CHAPTER VI

IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS

The proposed facility plan will have negligible resource commitments. The treatment facility site will occupy on the order of 15 acres of land within a 40-acre parcel, which will be removed from consideration for other uses during the life of the treatment facility. Small amounts of land will be committed to easements for the sewerage system. Construction of the sewerage system will temporarily destroy some flora, but this is not a permanent commitment, and regrowth of vegetation will occur. With regard to other physical parameters, such as water quality, fauna and marine resources, the effects of the proposed alternative plans would be, if not negligible, at least relatively minor and reversible.

The creation and construction of a regional sewerage system for sub-basins 9 and 10, for the Trident Support Site and the Poulsbo service area will impose on future generations the necessity for a strong commitment to the maintenance, expansion and continuation of the wastewater management systems now being developed. The selection of future alternatives for wastewater collection, treatment and disposal will, to a large extent, be limited by implementation of the selected plan.

A secondary--and desirable--effect is the population concentration induced by the interceptor location. By providing service in appropriately zoned areas designated in the General Plan (Reference 41), the interceptor location could stimulate development according to County planning goals. This will result in an irreversible environmental change with respect to the applicable properties by committing them to use for residential and commercial development purposes. By permitting relatively high-density development in areas so designated, the project will reduce the potential throughout the area for urban sprawl and strip development in contravention of the General Plan. The proposed plan will also protect the ecological resources of the rural areas along Clear Creek by locating the Trident Support Site interceptor sewer along highway rights-of-way and away from the corridor.

The proposed project will require permanent commitments of construction materials and a 1½ year commitment of construction workers for a combined value of $18 million. The materials would consist of concrete, steel, fabricated machinery, electrical components, wood forms and framing, and pipe. The supply of these materials is not known to be critically short, and their purchase and use would be beneficial to the regional and national economies.

The employment of construction workers for the regional facility would draw on a large labor pool at a time of high national unemployment. It cannot be predicted from where the workers might come, but their employment would be of national and state benefit, and they would reinvest some portion of their earnings in Kitsap County.

Any wastewater treatment system requires a commitment of energy resources for its operation. Electricity is used to power equipment and produce chlorine. This commitment is permanent for any energy expended but can be terminated when public health protection is no longer of prime importance.

VII SHORT TERM USES & LONG TERM PRODUCTIVITY

CHAPTER VII

RELATIONSHIP BETWEEN SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

IMPACTS OF THE PROPOSED ACTION

This section develops the relationships between basically negative, short-term impacts upon the environment and the ultimate benefits to be accrued from the proposed facility plan.

Physical Impacts

The negative, short-term physical impacts of the proposed project will be more than offset by the future benefits. Negative impacts can be reduced to: temporary (one to ten year) disruption of present types and quantities of vegetation along pipeline routes; temporary and localized disturbance of stream ecologies during construction; temporary (one to three year) disruption of marine benthic communities due to outfall construction; and a decrease in aesthetic appeal of the site selected for the treatment facility. There will also be construction impacts, which will include some traffic impacts due to construction workers and material hauling, construction noises and--along the interceptor route--temporary impacting of traffic where the pipeline follows highways and streets. For alternative plan No. 11, there would also be some very small and reversible damage to clam beds in Liberty Bay caused by the construction of the Poulsbo interceptor sewer.

Benefits to the physical environment would occur in varying degrees. Failure of septic tank drain fields will no longer occur in sewered areas connected to the treatment facility. As a consequence, existing pollution of streams and local groundwaters, which are used extensively for potable water supply, will diminish. Pollution of Dyes Inlet, Liberty Bay and Port Orchard channel will, in general, be diminished, and Health Department restrictions on shellfish harvesting in presently highly polluted areas probably could be lifted. Health hazards within the study area would be substantially reduced.

Adoption of the proposed facility plan would provide sewerage service and wastewater treatment to wastes originating at the Trident Support Site.

Resource Impacts

Construction of a treated effluent outfall will temporarily eliminate benthic organisms in a small area, and there would be some small temporary damage to clam beds in Liberty Bay.

Balancing these negative impacts, a substantial reduction in bacterial pollution of clam beds is expected, beginning with the elimination of septic tank drainage and primary level treated sewage discharges. Health Department restrictions upon certain clam harvesting areas might be lifted, particularly if Poulsbo, Keyport and the Naval Torpedo Station (Keyport) were to join the regional system.

Socio-Cultural Impacts

Development of a new major wastewater interceptor and treatment system in an area largely lacking these services provides to Kitsap County planners and officials a unique opportunity and mechanism by which growth may be controlled in a well-planned and orderly manner. The interceptor sewer routings and service areas generally correspond to areas designated by the Comprehensive Plan (Reference 41) for maximum urban development.

Placement of sewer interceptors in areas zoned for residential use will tend to fulfill the goals of the Comprehensive Plan (Reference 41). Urban sprawl and strip development will tend to be minimized, thereby maintaining agricultural and open space in areas so designated in the Plan. The routing of the Trident Support Site interceptor sewer away from the Clear Creek corridor will protect the rural designation of that area.

Growth-Inducing Impacts

Growth-inducing impacts are secondary effects of a project which either lead directly to growth (for example, by attracting large numbers of workers to an area) or which remove an obstacle to growth (for example, the construction of a highway which opens a new area for development).

The growth-inducing impacts of a service facility are related to a number of factors, including: other service facilities, labor force, capital, transportation network and markets. In Kitsap County there is another unique factor: the Trident Support Site.

Growth in Kitsap County between 1975 and 1995 will be induced primarily by the development of the Trident Support Site. According to the A.D. Little study, the county's population will rise from its current 114,480 (1975) to 170,989 by 1995. An estimated 31,702 persons, or 54% of the total increase, will be drawn into the county by the development of Trident. Since the proposed facility can accommodate only 18,000 people in the service area (exclusive of the populations of Poulsbo and Lemolo) in addition to the Trident Support Site flow, no excess service capacity will become available to stimulate additional growth until after 1995 (Reference 72). Instead, the facility will serve some of the additional population resulting from the Trident development and will channel Trident-induced growth along interceptor lines other than the interceptor serving the Trident Support Site. Current planning restricts access to the Trident interceptor as well as its size.

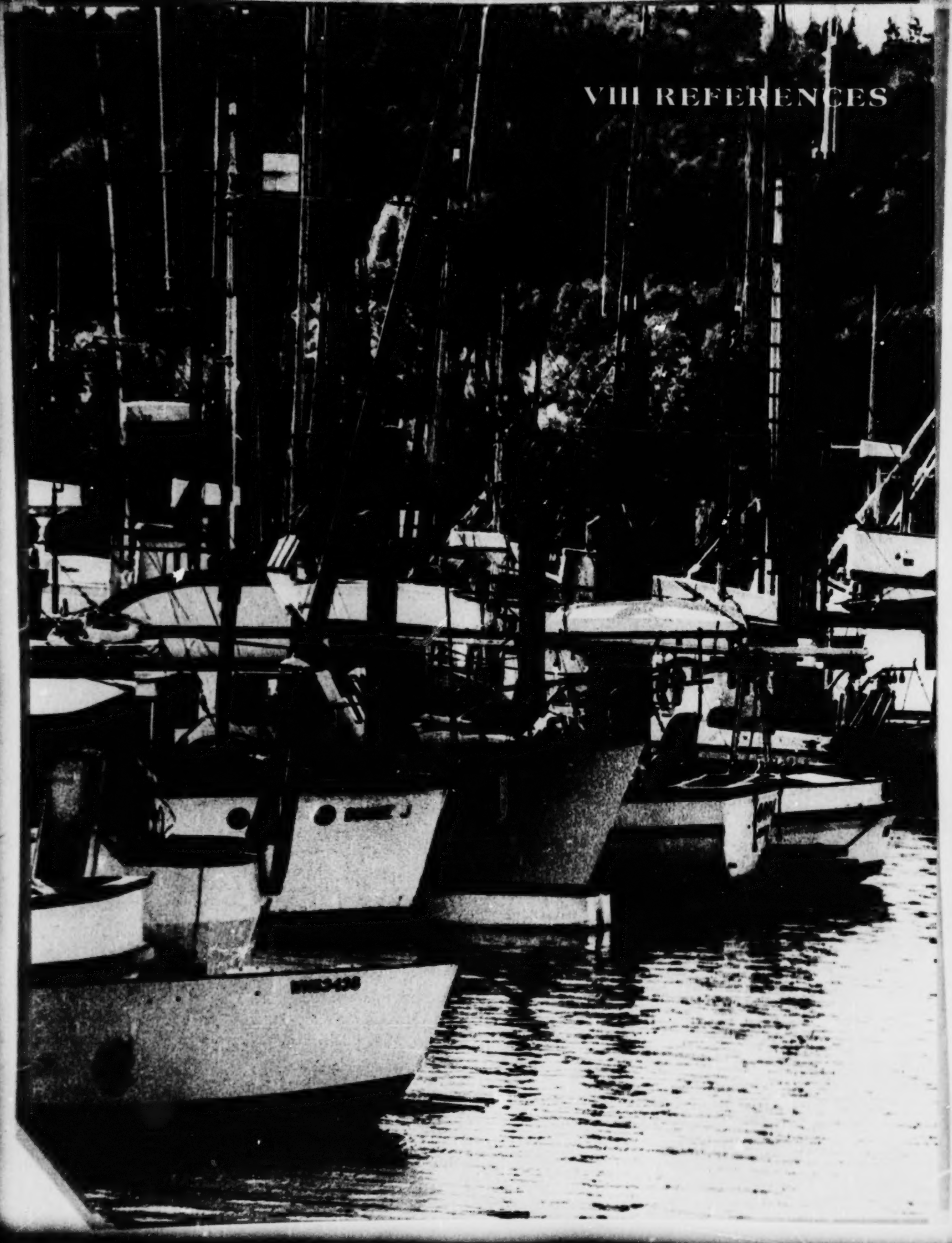
The rapid rise in local population will hit full stride in 1983, when the Trident Support Site is scheduled to become operational. The pressure on housing, schools and all other facilities and services required by a residential population will be severe, and the area will not be attractive to newcomers other than those employed at Trident, their dependents and those associated with public and private services that the area will need.

The existence of the proposed project will thus not have a significant growth-inducing impact in the area; for the foreseeable future, the entire growth capacity of the area will be strained to the limit, and beyond, in coping with a growth stimulus already under construction. When Trident is operating at its planned level, and associated growth has already taken place, the service capacity of the proposed facility will be utilized at or near its limits, thereby effectively eliminating itself as a source of future growth.

Rather than inducing growth, the proposed project will serve to channel growth toward its service area, as it mitigates a serious existing problem: the substandard treatment of sewage. Such an outcome is clearly desirable because the service area conforms to planning goals by providing service in urban and transitorial areas designated for growth.

There will be small indirect impacts attributable to the proposed project, stemming from the slight increase in jobs (20-40 is the preliminary estimate) necessary to operate the treatment system, sewer lines and pump stations and to manage the treatment system staff. There will thus be a minor increase in population, with attendant needs for housing and supplies, generating a small amount of business activity. In the context of Trident, this small increase will not measurably increase the growth pressure in Kitsap County and is probably substantially less than the precision of estimating population growth.

VIII REFERENCES



CHAPTER VIII

REFERENCES

1. The URS Company. Central Kitsap County Wastewater Facilities: Draft Facilities Plan, Seattle, Washington, July 1975.

2. Horsely, John. Kitsap County Trident Coordinator, Personal Communication, 13 August 1975.

3. U.S. Department of the Navy. Trident Support Site Final Environmental Impact Statement, July 1974.

4. Pace Corporation. Water Pollution Control and Abatement Plan for Drainage Basin 15, rough draft, Seattle, Washington, July 1973.

5. State of Washington Department of Conservation, Division of Water Resources. Water Resources and Geology of the Kitsap Peninsula and Certain Adjacent Islands, Water Supply Bulletin No. 18, 1965.

6. USDA Soil Conservation Service and Washington Agricultural Experiment Station. Soil Survey, Kitsap County, Washington, 1934.

7. USDA Soil Conservation Service. Interpretations of Soils for Land Use Planning, Supplement to Soil Survey of Kitsap County, Washington, January 1972.

8. U.S. Army Corps of Engineers, Seattle District, Environmental Resources Section. Washington Environmental Atlas, January 1972.

9. USDA Forest Service. Natural Vegetation of Oregon and Washington, USDA Forest Service General Technical Report, PNW-8, 1973.

10. Kingsbury, John. State of Washington Department of Natural Resources, South Puget Sound Area. Personal Communication, 9 July 1975.

11. ---------- State Lists of Endangered and Threatened Species of

the Continental United States, Federal Register, Vol. 40, No. 237, 1 July 1975.

12. Ingles, Lloyd G. *Mammals of the Pacific States*, Stanford University Press, Stanford, California, 1965.

13. Larrison, E.J. and Sonnenberg, K.G. *Washington Birds, Their Location and Identification*, Seattle Audubon Society, 1968.

14. Yocom, Charles and Dasmann, Ray. *The Pacific Coastal Wildlife Region*, Naturegraph Company, Healdsburg, California, 1965.

15. Stebbins, Robert C. *A Field Guide to Western Reptiles and Amphibians*, Houghton Mifflin Company, Boston, Massachusetts, 1966.

16. Peterson, Roger Tory. *A Field Guide to Western Birds*, Houghton Mifflin Company, Boston, Massachusetts, 1961.

17. Larrison, Earl J. *Field Guide to Birds of Puget Sound*, Seattle Audubon Society, 1952.

18. Lyons, C.P. *Trees, Shrubs and Flowers to Know in Washington*, J.M. Dent and Sons, Ltd., Toronto, Canada, 1956.

19. U.S. Department of Interior, Fish and Wildlife Service. United States List of Endangered Fauna, May 1974.

20. State of Washington Department of Game. Rare Mammals of Washington, 1 June 1973.

21. Lincoln, John H. Model Studies of the Port Orchard System and Adjacent Areas, Interim Report No. 2, University of Washington, Seattle, June 1975.

22. Kitsap County Planning Department. Basic Data and Related Sources to Shorelines, Port Orchard, Washington, February 1973.

23. Water Resources Engineers. Ecologic Modeling of Puget Sound and Adjacent Waters, prepared for EPA, Contract No. 14-31-001-3385, April 1975.

24. Census of Agriculture - Kitsap County, Washington. U.S. Department of Commerce, Bureau of the Census, September 1971.

25. Kitsap County Comprehensive Park and Recreation System Plan, by the ORB Company, October 1974.

26. Munton, John, Vice President, Industrial Departments, Cascade Natural Gas Company. Personal Communication, 15 July 1975.

27. Harstad Associates, Inc. Central Kitsap Study Area Comprehensive Plan. Seattle, Washington, June 1969.

28. Linder, Paul G., Superintendent of Central Kitsap School District No. 401. Letter of 22 July 1975.

29. Rutherford, F.C., County Assessor, Kitsap County. Assessed Valuations with Levies and Taxes for 1975. Port Orchard, Washington, 1975.

30. State of Washington Employment Security Department. Employment and Payrolls in Washington State by County and by Industry, No. 112, 3rd Quarter, 1974.

31. U.S. Department of Labor, Manpower Administration. Manpower Profile, Kitsap County, Washington, September 1972.

32. Porterfield, Robert, Planner, Kitsap County Planning Department. Personal Communications, 11 and 15 July 1975.

33. Puget Sound Council of Governments. Data Transmittal from Jan Pilskog, PSCG, July 1975.

34. Arthur D. Little, Inc. Preliminary Allocations of Population and Households to Subareas Under Alternative Policy Models, to Central Puget Sound Economic Development District, 7 May 1975.

35. Sanderson, John, Superintendent of Public Works, Kitsap County Public Works Department. Personal Communication, 11 July 1975.

36. Williams, Richard, Environmental Planner, URS Company. Personal Communications, 8, 10 and 14 July 1975.

37. Brincken, Glen, Assistant Manager of Customer Service in Marketing, Puget Sound Power and Light Company. Personal Communication, 16 July 1975.

38. Benham, Shirley, M.D., Department of Public Health, Kitsap County. Personal Communication, 11 July 1975.

39. Loop, Enzo, Kitsap County Traffic Engineer. Personal Communications, July 1975.

40. Kitsap County, Washington. Kitsap County Planning Policies: Outline for the Future Growth of Kitsap County, Washington: An Element of the Kitsap County Comprehensive Plan. Approved 24 February 1970.

41. Kitsap County, Washington. Amendment to Kitsap County Planning Policies: Outline for the Future Growth of Kitsap County, Washington: An Element of the Kitsap County Comprehensive Plan. Approved 24 June 1975.

42. Weigle, Joseph and Brown, Eleanor, Kitsap County Health Department. Personal Communications, 11 July 1975.

43. Benson, Charlotte L. Archaeological Reconnaissance in the Clear Creek Drainage, Eastern Kitsap Peninsula, University of Washington, Office of Public Archaeology Reconnaissance Report No. 3, 3 February 1975.

44. Shobert, Cheryl, Office Administrator, Kitsap County Assessor's Office. Personal Communication, 22 July 1975.

45. Savoie, Gordon, Manager of Bond Investments, Security National Bank. Personal Communication, March 1974.

46. Hill, Ingman, Chase and Company. Comprehensive Water and Sewerage Plans for Central Kitsap County, Seattle, Washington, January 1970.

47. Engineering-Science, Inc. Pollutional Effects of Drydock Discharges, a report to the Department of the Navy, Contract No. N62474-73-C-5275, October 1973.

48. Li, Richard C.T. City of Poulsbo Facilities Plan for Proposed Sewerage Facilities, Seattle, Washington, June 1974.

49. Kramer, Chin and Mayo, Inc. A Comprehensive Sewerage System Improvement Plan for the City of Bremerton, Washington, March 1974.

50. The URS Company. Environmental Impact Statement for the Hansville Road Solid Waste Disposal Site, Seattle, Washington, March 1974.

51. Sopper, W.E. and Kardos, L.T. Recycling Treated Municipal Wastewater and Sludge through Forest and Cropland, Pennsylvania State University Press, University Park, 1973.

52. Stetson, John, State of Washington Department of Ecology. Personal Communication, 16 July 1975.

53. Lincoln, John H. and Collias, Eugene E. An Oceanographic Study of the Port Orchard System, Final Report, University of Washington, Seattle, 1975.

54. Yearsley, John R. Application of an Ecological Model to Port Orchard, Sinclair Inlet, Dyes Inlet and Liberty Bay Subsystem of Puget Sound, U.S. Environmental Protection Agency, Region X, Surveillance and Analysis, December 1975.

55. Peck, Craig G., *et al*. Mathematical Model of Three Proposed Port Orchard System Outfall Sites, Parametrix, Inc., Seattle, Washington, November 1975.

56. Arthur D. Little, Inc. Analysis of Selected Impacts of Trident Related Population Growth in Kitsap County, San Francisco, September 1975.

57. Fusco, Steve. Letter to Herb Armstrong of Roots Engineering, 28 November 1975.

58. Kitsap County, Washington. Kitsap County Planning Policies: Outline for the Future Growth of Kitsap County, Washington. Approved by Board of Kitsap County Commissioners, 28 July 1975.

59. Lemolo Citizen's Club. Letter of 19 December 1975 to Steve Fusco of URS Company.

60. Sanderson, John, Superintendent of Public Works, Kitsap County. Personal Communication, 16 December 1975.

61. The URS Company. Central Kitsap County Wastewater Facilities: Facilities Plan, Draft Supplement (December 1975); Final Plan (March 1976), Seattle, Washington.

62. Northwest Environmental Consultants. Biological Baseline Studies and Impact Assessment, Central Kitsap Facilities Plan, Bainbridge Island, Washington, September 1975.

63. Armstrong, Herbert, Poulsbo City Engineer. Personal Communication, 17 December 1975.

64. Cox, Thomas, Keyport Public Works Department. Personal Communication, 18 December 1975.

65. Smith, John, Commissioner, Kitsap County Sewerage District No. 4. Personal Communication, 18 December 1975.

66. Fusco, Steve, URS Company. Personal Communication, 24 November 1975.

67. Voglantz, Lawrence, Kitsap County Department of Public Works. Personal Communication, 16 December 1975.

68. Loop, Enzo, Kitsap County Engineering Department. Personal Communication, 16 December 1975.

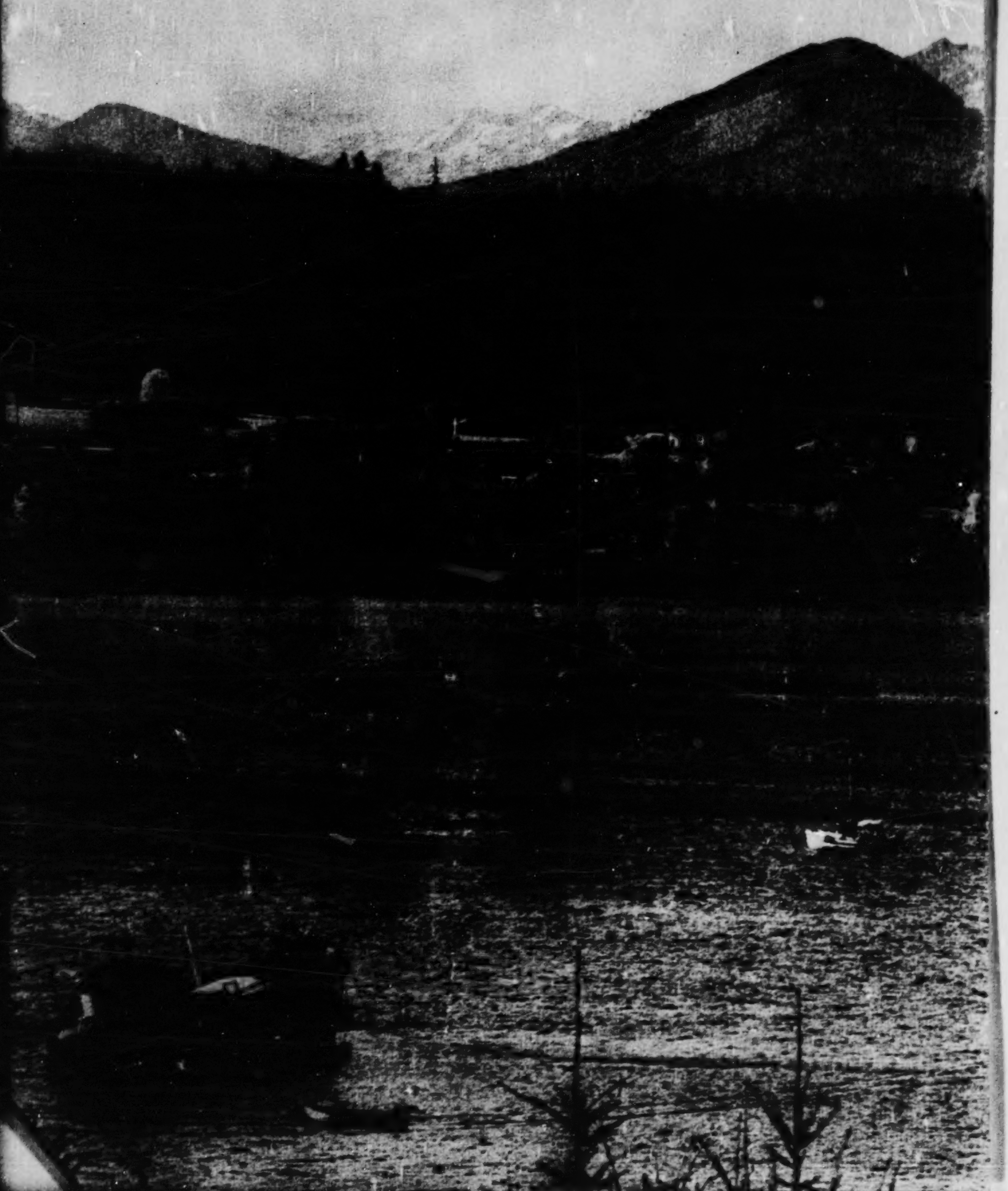
69. Bullard, L., Kitsap County Engineering Department. Personal Communication, 23 December 1975.

70. Sullivan, Larry, Project Director, URS Company. Personal Communications, 29 December 1975.

71. Hollenbeck, Peggy, Associate Planner, Kitsap County Planning Department. Personal Communication, 24 December 1975.

72. Fusco, Steve, URS Company. Personal Communication, 8 January 1976.

IX COMMENTS & RESPONSES



CHAPTER IX

COMMENTS TO THE DRAFT AND SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT STATEMENTS AND RESPONSES

The Environmental Protection Agency held a public hearing on the Central Kitsap County Draft Environmental Impact Statement on October 29, 1975 at Central Kitsap County High School in Silverdale, Washington. The hearing was attended by approximately 75 people of which four presented testimony for the record on the statement. Because of the length of the official hearing record and the costs involved, we have not reproduced the document here. It is, however, available for public scrutiny at the Kitsap Regional Library in Bremerton, Washington, and in branch libraries at Silverdale and Winslow, Washington, and at EPA's Region X Office, Seattle, Washington.

A brief summarization of major concerns voiced at the hearing includes:

1. David Heiser of the Washington State Parks and Recreation Commission stated that the Commission was not in favor of outfalls at Manchester or near Fay Bainbridge State Park because of impact on tidelands owned by the State and which are utilized by the public for swimming, clam digging and other recreational activities.

2. Mr. Robert Gedney, a Bainbridge Island resident, stated that the Draft EIS does not focus on environmental matters to the degree needed. He expressed concern about the total capacity of Puget Sound for receiving effluent discharges; necessary precautions that should be taken to maintain water quality in Puget Sound; and location of the selected outfall alternative. Mr. Gedney pointed out that tracer studies would show that tides were often of diverse nature in the water at proposed outfall sites on windy days and suggested use of radioisotopes for study of dispersion characteristics of alternative sites. He questioned whether Kitsap County has the capability to handle many small sewerage treatment plants, and stressed the advantages of regional treatment. In addition, the nature of the Navy's industrial wastes and the pre-treatment that is given to effluent discharged by the Navy were also presented as concerns to be considered.

3. Mike Krieger, a Bainbridge Island resident, asked why the Port Orchard site was shown as a better outfall site and received higher rating relative to water quality than was the main Puget Sound, east of Bainbridge Island, and requested further explanation and re-evaluation of the alternative outfall sites.

4. Joel Haggard, attorney representing C. A. Ross, made reference to comments he had formally presented to EPA by mail (see Comments Section). He listed several matters to be considered, such as: what further environmental analyses are required and who will do them; definition of land use policies by the County and

evaluation by EPA in the Final EIS; regarding Trident: will construction people reside on or off the base? What are final population projections? What would be the cost impact and who would pay taxes if the Navy moved out of the area? What is the per capita cost, using realistic bond rates? Since alternatives are totally inadequate in his client's view, why is service to Trident assumed and why can't the Navy treat wastes on the base and recycle? If a regional system is selected as the best alternative, will Bremerton cooperate?

Following these presentations, a question and answer period was conducted to enable attendees to clarify issues of interest or concern. Issues raised during the discussion period at the public hearing have been covered in the Supplement to the Draft EIS and in this Final EIS.

The Environmental Protection Agency, Region X wishes to express its appreciation to all commenting agencies, groups and individuals for the time and effort spent in reviewing the Draft EIS. All comments were presented to the Regional Administrator and were considered by him in EPA's preparation of the Final EIS.

COMMENTS RECEIVED

KITSAP COUNTY, WA DRAFT EIS

1975 Date Rec'd	From	EIS Page No.	Gen. Tone	POP. PROJECTION-GROWTH	EXCESS CAPACITY	LAND USE, PLANNING	REGIONALIZATION	COSTS	WATER QUALITY	FISHERIES	ALTERNATIVES	CONSTRUCTION IMPACTS	INDUSTRIAL WASTES	MITIGATIVE MEASURES	SLUDGE DISPOSAL	AIR QUALITY	FEDERAL POLICY	OTHER
9/18	U.S. Dept. of Agriculture Soil Conservation Service	IX-6	Support.											X				
9/23	Robert Gedney	IX-10	Crit.				X		X				X					Tertiary treatment; Format
9/24	Washington State Department of Game	IX-22	Generally Support.						X									Wildlife
10/9	Department of the Army Corps of Engineers	IX-135	Support.															Section 10 permit
10/10	Puget Sound Council of Governments	IX-41	Crit.		X				X					X				201 Coordination
10/16	Department of Housing and Urban Development	IX-137	Crit.	X				X										
10/20	U.S. Department of Agriculture Soil Conservation Service	IX-7	Support.															Soils
10/20	Puget Sound Air Pollution Control Authority	IX-37	Support.													X		
10/20	Bainbridge Is. Concerned Citz.	IX-161	Crit.						X	X								
10/21	Washington State Department of Highways	IX-35	Support.															Hwy construction
10/21	Washington State Department of Fisheries	IX-26	Support.						X	X				X				
10/21	Attorney for C. A. Ross	IX-45	Crit.	X		X	X	X	X	X	X		X	X	X	X	X	
10/22	Attorney for Lemolo Citizens Club	IX-158	Environ. Unsat.				X	X	X									
10/23	Washington State Parks & Recreation Commission	IX-29	Crit.							X								
10/28	Washington State Department of Ecology	IX-20	Support.				X						X					
11/4	Alton Priddis	IX-171	Crit.															
11/7	Mr. & Mrs. Edward Vig	IX-173	Crit.								X							Farmlands
11/10	Eric Kegley	IX-172	Crit.								X							Farmlands

COMMENTS RECEIVED

KITSAP COUNTY, WA DRAFT EIS

1975 Date Rec'd	From	EIS Page No.	Gen. Tone	POP. PROJECTION-GROWTH	EXCESS CAPACITY	LAND USE, PLANNING	REGIONALIZATION	COSTS	WATER QUALITY	FISHERIES	ALTERNATIVES	CONSTRUCTION IMPACTS	INDUSTRIAL WASTES	MITIGATIVE MEASURES	SLUDGE DISPOSAL	AIR QUALITY	FEDERAL POLICY	OTHER
11/11	Mr. & Mrs. Don Schoner	IX-174	Crit.								X							Farmlands
11/11	Northwest Steelheaders Council of Trout Unlimited	IX-152	Crit.						X		X							
11/11	Mrs. Laurence Copeland	IX-175	Crit.								X							Farmlands
11/11	Mr. & Mrs. David Edwards	IX-176	Crit.								X							Farmlands
11/11	Mrs. Lorraine Anderson	IX-179	Crit.								X							Farmlands
11/11	Gerald Peterson	IX-178	Crit.								X							Farmlands
11/13	Clear Creek Community Improvement Club	IX-149	Crit.	X		X					X			X				
11/14	Washington State Commissioner of Public Lands	IX-39	Crit.								X		X					
11/14	U.S. Department of Interior	IX-142	Crit.								X	X		X				Historic sites; Parks;recreation
1976 1/26	Arthur M. Skolnik Washington State Conservator	IX-34	Support.															Historical-Archaeological Clearance

COMMENTS RECEIVED

KITSAP COUNTY, WA SUPPLEMENTAL DRAFT EIS

1976 Date Rec'd	From	EIS Page No.	Gen. Tone	POP.PROJECTION-GROWT	EXCESS CAPACITY	LAND USE, PLANNING	REGIONALIZATION	COSTS	WATER QUALITY	FISHERIES	ALTERNATIVES	CONSTRUCTION IMPACTS	INDUSTRIAL WASTES	MITIGATIVE MEASURES	SLUDGE DISPOSAL	AIR QUALITY	FEDERAL POLICY	OTHER
2/9	State of Washington Off. of Community Development	IX-19	No Comment															
2/19	Lemolo Community Club	IX-153	Crit.			X												
2/27	Department of Housing and Urban Development	IX-141	No Comment															
3/3	Department of the Army Corps of Engineers	IX-136	Support.															Army permit requirements
3/19	George A. Hartman	IX-168	Crit.	X		X					X							Disposal sites
3/22	Department of Interior Pacific Northwest Region	IX-146	Support.							X								Indian Reservation coordination
3/23	Puget Sound Air Pollution control	IX-38	Support.													X		
3/24	Kitsap County Planning Dept.	IX-125	Support.	X		X												General
3/24	Department of Game	IX-25	Crit.															Secondary wild-life impacts
3/29	CH2M Hill	IX-155	Crit.					X										Sinclair Inlet sewerage plan
3/29	Attorney for C. A. Ross	IX-109	Crit.	X	X	X	X	X	X		X		X	X	X		X	
3/29	U.S. Department of Agriculture Soil Conservation Service	IX-9	No Comment															
3/29	Washington State Parks & Recreation Commission	IX-33	No Comment															

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Room 360 U.S. Courthouse, Spokane, Washington 99201

September 16, 1975

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Sir:

Thank you for the opportunity to review your draft environmental impact statement on the Central Kitsap County Wastewater Facilities, Washington, EPA Project C-530494-01. It would appear the items of concern to the Soil Conservation Service have been adequately covered.

Our only comment for your consideration would be in regard to Chapter V, Adverse Impacts and Mitigative Measures. We would suggest that wording of mitigative measures be strengthened to indicate positive action rather than recommendations. Words such as "could", "should", and "can be" do not indicate that the mitigative measures will be achieved. Wording that includes "shall", "will", etc., would strengthen these portions of Chapter V. 1

If we can be of further service to you on this or other projects, please do not hesitate to let us know.

Sincerely,

Jerry L. Scrivner, Acting
Galen S. Bridge
State Conservationist

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UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Room 360 U.S. Courthouse, Spokane, Washington 99201

October 16, 1975

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

The environmental impact statement draft for Central Kitsap County Wastewater facilities has been reviewed by this office. A notable effort has been made to provide a clear understanding of the complex features of the proposal.

In the discussion of soils (P. II-4), reference is made in the second sentence to the Alderwood and Edmonds series being underlain with hardpan or bedrock. The reference to bedrock should be deleted from the sentence as the soils mentioned are only associated with the cemented hardpan condition. 2

Drainage basin numbers 9 and 10 are frequently noted in the statement. It is suggested that the delineation system to which these numbers apply be footnoted. Several delineation systems are utilized in the state and clarity would be served if the system was identified. 3

The opportunity to review the statement for this project has been appreciated.

Sincerely,

Galen S. Bridge

Galen S. Bridge
State Conservationist

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Response to letters from U.S. Department of Agriculture

1. With regard to the mitigative measures recommended for the preferred alternative, most will be handled by Kitsap County through construction specifications of the pipelines and facility or by the NPDES permit issued by EPA. The County has expressed interest in maintaining current zoning designations. Any mitigative measures not enforced locally will be included as conditions for grant approval by EPA. See specific discussion in Chapter V.
2. The correction has been made.
3. The drainage basin numbers designated for the study area were obtained from the "Water Pollution Control and Abatement Plan for Drainage Basin 15," prepared by the Pace Corporation of Seattle, Washington. This report was identified as Reference 4 in the draft EIS.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Room 360 U.S. Courthouse, Spokane, Washington 99201

March 24, 1976

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

We have reviewed your supplement to the draft environmental impact statement for the Central Kitsap County Wastewater Facilities (EPA Project No. C-530494-01) and find we have nothing further to add to our letter of September 16, 1975 relative to this project.

Thank you for the opportunity to review your supplement.

Sincerely,

Galen S. Bridge
State Conservationist

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MAR 29 1976

ROBERT H. GEDNEY
ROUTE 7, BOX 7951
BAINBRIDGE ISLAND, WASHINGTON 98110
TEL. (206) [illegible]

September 22, 1975

Mr. Richard R. Thiel
Chief, Environmental Impact Section
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Wash. 98101

Reference: Your M/S 443
Aug. 25

Dear Mr. Thiel:

Thank you for your above referenced acknowledgement and the Draft E.I.S. of the Central Kitsap County Wastewater Facilities, which I subsequently received. In accordance with your invitation, I am pleased to submit herewith my attached comments on the E.I.S. and related matters.

The very recent public announcement of the reported high level of mercury pollution in Liberty Bay is a most tangible demonstration of the two major concerns about the Kitsap County Wastewater Facilities which I expressed in my letter of Aug. 8 to Director Biggs, namely:

i) studies are needed to fill the gap of information about the effects of wastewater discharges into the main channels of the Sound on the bays and inlets of the Sound shoreline; and 1

ii) the nature and characteristics of the proposed waste effluents need further evaluation with respect to toxicants, particularly from the Trident facility. 2

Likewise the overall capability of the Sound to receive toxicants at present and projected levels needs immediate evaluation.

Although the forgoing matters are noted casually in the E.I.S., the signifigance is submerged in the imposing aggregation of verbiage and computerized presentation of the text. In reading the Statement one has the feeling the authors are ritually conforming to a prescribed format and do not wish to delve deeply into basic environmental concerns.

I am aware that E.P.A. has, in preliminary form,data on mercury and PCB levels in Puget Sound. The question should be asked as to the capability of the Sound to accept further loadings of existing waste systems, as well as projected loads, with respect to marine life systems. 3

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The matter of Tertiary treatment requirements needs some further discussion. What might be its goals and what might it consist of? In Puget Sound the Tertiary treatment requirements might be significantly different from those of freshwater environments. 4

Another matter of signifigance is the proliferation of treatment systems in Kitsap County. Is it reasonable that each municipality such as Poulsbo, Bremerton and Silverdale should have its own system. The administration and operation of these separate systems may well become so costly and complex that the separate municipalities simply will not be able to support these costs. In the matter of laboratory control alone, the costs of complex routine tests which should be made may well be beyond the budgeted funds available, let alone the provision of skilled personnel for their undertaking and evaluation. Shouldn't some thought be given to at least a county organization and operation. 5

I appreciate the opportunity of submitting these comments and I would like to be further informed about these matters.

Encl./Comments

Sincerely yours,

Robert H Gedney
Robert H. Gedney

cc Mr. John Biggs

September 22, 1975

COMMENTS BY ROBERT H. GEDNEY
ON THE DRAFT E.I.S.
CENTRAL KITSAP COUNTY WASTEWATER FACILITIES
Dated Aug. 1975

1. Page xii, 5th par.

The statement is made that, "Development of a sewer interceptor system..... will tend to promote growth along corridors of sewerage availability."

This premise is open to serious question as such lands will have higher costs and taxes and thus new housing may continue to seek lowcost lands unless the County exercises zoning and positive control measures to restrict or limit land development to sewered areas.

2. Pg. I-3, Fig. I-1

Sub-basins 9 and 10 should be shown on the figure.

3. Pg. I-4, under SUMMARY

The major issues noted include an item on "marine water quality". However, there is no mention of marine ecology which should be a major environmental concern.

4. Pg. I-8, under Alternative Plan No. 9

It appears that the matter of the esthetics of the Manchester Site visibility are overemphasized... perhaps a better statement would merely emphasize the need for appropriate screening and landscaping.

5. Pg. I-11, Table I-1

The table would be enchanced by addition of a column on comparative costs.

6. Pg. II-32, under the Section, MARINE WATER QUALITY REGULATIONS AND STANDARDS

The standards cited are only primary physical and biologic standards. There is a real need to discuss toxicants, heavy metals, chlorinated hydrocarbons and other hazards to the marine environment.

7. Pg. II-33, under Physical Marine environment

No mention or concern is expressed about the possible buildup of waste loadings in the many small bays and inlets which could result from effluent discharges into the main channels of Puget Sound.

8. Pg. II-55, last par. under MARINE WATER QUALITY

No discusion is presented with respect to whether there is an adequate data base to evaluate presence or absence of toxicants in the Sound.

9. Pg. II-36, 4th paragraph

The discussion of the effects of wasteload nutrients is very lightly treated. Do competent authorities consider that nutrient removal is a significant factor with respect to ecologic conditions in the Sound? My preliminary and informal advice is that they do not.

10. Pg. II-37, Discussion of model limitations and their implications

Again there is no mention about possible effects of main channel discharges on bays and inlets... nor is there any mention as to how the shortcomings of the model should be remedied, i.e. through prototype measurements.

11. Pg. II-39, last par.

There is no mention as to how a Pt. Monroe Outfall might affect Port Madison, Eagle Harbor and Suquamish Bay locations.

12. Pg. II-42, under BIOLOGICAL MARINE ENVIRONMENT

This entire section is merely descriptive in terms of the animal life and fauna in the Sound. There is nothing suggestive of evaluations of present and projected waste loads on the environment... in other words a waste loading evaluation.

13.Pg III-4, 4th and 5th par's.

These paragraphs leave many important questions unasked, for example -

In the reported occurrence of various metals/and hydrocarbons from the existing facility as wastes, were measurements made to determine whether other toxicants were present such as mercury, PCBs, etc..

Why hasn't the Navy taken steps to end these discharges? What is their zone of influence?

Why isn't it vitally important that the Navy go on record as to the kinds of toxicants expected from Trident, the estimated loadings, the kind of treatment proposed and an evaluation furnished by the Consultant as to the effectivety of such treatment and dependability of special treatment measures.

Should a closed system of waste discharge and reuse be considered for Trident to avoid hazards to the Sound?

In par. 4 it is stated that industrialization is virtually nonexistant in the tributary area and is expected to remain so. With a projected population increase of about 40,000 to year 1990, it can certainly be expected that at the least, fringe commercial-industrial development will occur and that correspondingly precautionary measures will be necessary to avoid toxicant waste loadings.

14. Pg III-7, under Bremerton

Were analyses performed to determine presence of toxicants in the domestic sewage, or were the analyses limited to routine parameters?

15. Pg. III-28, under Project Costs

There is no information as to how the Study Area's share of the costs were determined. There is no presentation of costs to the user, at least in some simplified form. The presentation of Annual Costs in the E.I.S. is obscure with respect to the user who will support the system. There is also lacking any discussion of cost efficiency/of combining the various systems.
and benefits

16. General

There is no discussion as to what might be involved in ultimate tertiary treatment, although under E.P.A. guide lines this might be an imminent requirement.

Response to letter from Mr. Robert H. Gedney

1. An evaluation of the effect of wastewater discharges upon Puget Sound is a worthwhile project but totally beyond the scope of this EIS. Our analysis indicates that land disposal is infeasible; therefore, some form of discharge to the Sound is all that remains. The EIS studies on the Sound waters adjacent to the study area do estimate effects, and on the basis of these studies Dyes Inlet, Sinclair Inlet and Port Orchard channel at Enetai were unfavorably rated.

2. Waste effluents from domestic or typical municipal sources have been studied nationwide. Because of this we are able to say with confidence that, with proper secondary level treatment, chlorination and de-chlorination, any domestic wastewater would be acceptable under the preferred alternative. Admittedly, we do not know specifically what toxic matter may be discharged by the Trident facility. However, any toxic material that cannot be removed by the regional facility will have to be removed by the U.S. Navy in a pretreatment process, as required by 40 CFR Part 128.

3. Unfortunately this is far beyond the scope of this study. Our results indicate that, for the preferred alternative, local effects will be insignificant, but this does in part depend upon flushing of diluted effluent into the main body of Puget Sound.

4. It is agreed that tertiary treatment requirements may differ for fresh and saline waters. There is no specific tertiary treatment level or process that is defined by law or by the engineering profession. In effect, tertiary treatment means any major processes that must be added to standard secondary treatment processes in order to achieve or maintain receiving water quality standards. The recommended alternative will not require a tertiary add-on-process to meet water quality standards at this time, and we have no information concerning the upgrading of receiving water quality standards.

5. We agree and firmly believe that a regional treatment system, barring large transport costs, is the most cost-effective solution. For this reason, we are recommending regionalization with Poulsbo, Silverdale and all major wastewater sources in the study area. Inclusion of Bremerton did not turn out to be as cost-effective, not is it considered institutionally feasible (See earlier comments of CH2M and City of Bremerton).

Response to comments:

1. It is understood from Mr. Gedney's statement that the physical presence of sewerage will raise the costs and taxes on land, making development on that land more expensive. It is recognized that sewerage systems, no matter how they are implemented, will result in increased property values. However, Kitsap County does have the

option, through judicious zoning, of forcing new growth to concentrate in areas of sewerage availability. It is hoped that the County will implement a planning policy that will designate, and make coincident, areas for sewerage and growth. In terms of additional cost, most housing developments under construction in unsewered areas of the county are already installing dry sewer systems, temporarily leading to local septic fields, in anticipation of a future sewerage system.

2. The relationship between the study area and drainage sub-basins 9 and 10 is appropriately described in Chapter II, Figure II-1.

3. Marine ecology as an issue is secondary to marine water quality in that any substantial effects upon marine ecology would come about as a result of changes in water quality due to effluent discharges. Since marine water quality is the controlling factor, it was singled out as a major issue. However, the environmental assessments were made with careful attention to possible impacts upon marine organisms, and these were identified in the appropriate statements. Most effects upon marine ecology should be negligible.

4. Within the rigid limits of an evaluation of aesthetics for each alternative, the Manchester site is appropriately treated. The relative concern or weight of aesthetics as an issue is resolved in the EVAL system by multiplying each category score by a weight factor, indicating its importance to local citizenry in the overall environmental scheme.

5. Comparative costs are presented elsewhere in the Draft EIS and have been integrated into the overall ratings of each alternative.

6. Additional water quality standards are presented in Appendix F. It is unreasonable to expect every proposed discharger to marine waters to question the adequacy of criteria set by law, in an environmental impact statement. Existing criteria have been promulgated with the intent of protecting the environment within the boundaries of proven or probable damage and the technical feasibility of correction.

7. Our study results, and those of the facilities planner, indicate that there is a net flow of water from bays and inlets into the main body of Puget Sound. With this net flow, and the high dilution anticipated for any Puget Sound discharge, waste buildup should be negligible and temporary in small bays and inlets.

8. This is beyond the scope of our study. We have only evaluated the water quality criteria at our points of discharge.

9. Our estimates of the effects of waste nutrients are presented in the final EIS. A much more detailed discussion of a computerized modeling of nutrient loadings is presented in the final Facilities

Plan document which was one of the bases for our studies.

10. The shortcomings of the hydraulic simulation model, which was realistically evaluated in the draft EIS, could be overcome only by reassessment of model parameters through field measurement of currents in Puget Sound. This was the purpose of the Phase II oceanographic studies, the results of which are presented in Chapter II of the draft supplemental and final EIS. In general, we felt that our independently used continuity equations produced answers comparable to the modeling reported in the final Facilities Plan document.

11. In view of the excellent dilution expected at the Point Monroe site, it is estimated that effects of the discharge upon other areas would be very minor if not undetectable.

12. A quantitative evaluation with any assurance of accuracy is virtually impossible at the present state-of-the-art. Please see the responses to the letter from the Washington State Parks and Recreation Commission.

13. Mr. Gedney has misread the paragraphs in question. Measurements of shipyard wastes were not made at the Trident site but at other drydocks along the West Coast. Various metals and toxicants were measured, but EPA's consultant is not free to disclose the information. Presumably the U.S. Navy will use this information internally to develop estimated waste characteristics for the Trident site. The referenced study also found that commonly available treatment processes could remove the pollutants from these wastewaters.

    The final EIS contains the facilities planning consultant's estimate of Trident waste characteristics. The U.S. Navy has not released their estimates of waste characteristics, but Title 40 of the U.S. Code, Chapter 1, Subchapter D, Part 128, ensures that industrial wastewaters will be pretreated for compatibility with municipal treatment works. This means that the combined processes must meet desired effluent and receiving water quality criteria.

    With regard to fringe industrial development, future growth has not yet been predicted. If it should occur within the context of a publicly owned sewerage and treatment system, pretreatment requirements will ensure a safe and acceptable treated effluent. If fringe industrial development should happen with no sewerage systems available, the industries would be forced to treat their own wastewaters but would still discharge to the waters of Puget Sound. This would be a less acceptable course of action.

14. The wastewater characteristics for Bremerton were assumed by the facilities consultant to be typical of municipal wastewaters. No analyses were conducted on Bremerton's wastes. Standard wastewater

treatment processes envisioned in the economic analysis of alternatives are adequate to remove typical municipal wastewater toxicants to a harmless level. Any unusually resistant or persistent toxicants would be dealt with accordingly, in order to maintain receiving water standards.

15. The discussion of project costs has been expanded in Chapters I and III of the final EIS.

16. EPA defines Best Practicable Waste Treatment in its publication No. 430/9-75-013 of October, 1975 as secondary treatment, or higher if required to meet water quality standards, for treatment and discharge to surface waters. Again, we feel that water quality criteria can be met with only secondary level treatment for a discharge to north Port Orchard channel.

DANIEL J. EVANS
GOVERNOR

RICHARD W. HEMSTAD
DIRECTOR

STATE OF WASHINGTON
Office of the Governor
OFFICE OF COMMUNITY DEVELOPMENT
OLYMPIA, WASHINGTON 98504
206/753-2200

February 5, 1976

File No. 1236

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

This letter will acknowledge receipt of the Supplement to the Draft Environmental Impact Statement on the Central Kitsap County Wastewater Facilities EPA Project No. C-530494-01.

If you have not received a response from this Office by the end of the review period, you can assume that we have no comments on this project.

Sincerely,

Lois E. Dufresne

Lois E. Dufresne
A-95/EIS Coordination Section
Community Planning Division
LED:1

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FEB 9 1976

State of
Washington
Department
of Ecology

October 27, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

RE: Draft Environmental Impact Statement,
Central Kitsap County Wastewater Facilities

Dear Mr. Thiel:

Thank you for the opportunity to review this document. It is apparent that you have compiled a relatively complete document covering your project. This draft reflects an example of a well prepared statement which contributes to the better understanding of the areas of the proposal.

Review by our regional and headquarters staff members has produced these points:

1. Possibly some information addressing how and to what extent the industrial waste of Trident could have with regards to the proposal. 1
2. Some mention of the cost of a non-regional plant could be added to assist in the comparison of regional vs. non-regional alternative. 2

We appreciate the opportunity to have reviewed your statement. If we can be of futher service to you, please contact me at 753-6892.

Sincerely,

DR. Thompson

D. R. Thompson, C.E.T., P.E.
Environmental Review Section

DRT:jw

cc: Larry Lewis, N.W. Region

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OCT 28 1975
EPA-EIS

Response to letter from State of Washington, Department of Ecology

1. A discussion of Trident Support Site wastes is presented on pages 2 and 3 of Chapter 3 of the final EIS. At this point, it is not known exactly what the Trident wastes will contain, and the acceptability of these wastes for treatment in the County's facility lies with the intent of the U.S. Navy to provide pretreatment and the wording of the County's contract accepting these wastes.

2. The cost of a nonregional facility vs. the cost of the regional facility is best explained in Chapter 1 of the final EIS where Poulsbo's option to join the regional facility system is evaluated. Readers are also directed to Kitsap County's Final Facilities Plan for this cost information.

DEPARTMENT
OF GAME

600 North Capitol Way / Olympia, Washington 98504

Game Commission
Claude Bekins, Seattle, Chairman
Glenn Galbraith, Wellpinit
Frank L. Cassidy, Jr., Vancouver
Arthur S. Coffin, Yakima
Elizabeth W. Meadowcroft, Tacoma
Archie U. Mills, Wenatchee

Director / Carl N. Crouse
Assistant Directors / Ralph W. Larson
Jack S. Wayland

September 19, 1975

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Attention: Mike Mills, Office of Program Planning and
Fiscal Management, State of Washington

Dear Mr. Thiel:

The draft environmental impact statement Central Kitsap County Wastewater Facilities, EPA project number C-530494-01, was reviewed by our staff as requested. Our comments follow the format of your report.

Your statement seems quite extensive and well done. It is obviously a sincere and objective effort to assess effects of the proposed action. Our main concern is maintenance and enhancement of sport fish and wildlife in the State of Washington.

Environmental Impacts:

The word "displace" is used to describe what the construction of a new wastewater treatment facility will do to wildlife (page IV-9). We must object to such usage of the word "displace", on principle. It suggests that the wildlife will successfully relocate elsewhere. Loss of wildlife habitat, however small, means a proportional reduction in wildlife numbers. Use of space which is now wildlife habitat for a sewage plant will not simply cause wildlife to relocate, but will act to significantly reduce wildlife numbers at the site at least for the lifetime of the project.

We noted that alternatives three and four necessitate saltwater crossings of the pipeline (page IV-18). In considering the full potential impacts of this measure, should not the possible effects of pipeline rupture be examined? 1

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Adverse Impacts and Mitigative Measures:

The indication that you will seek recommendations from the Soil Conservation Service and the Department of Fisheries concerning construction of sewer lines through creeks (page V-6) is certainly commendable. A joint hydraulics permit is required from our department and the Department of Fisheries for work to be done within the wetted perimeter of streams.

The statement, "Assessment of the effects of wastewater discharge upon the benthic community is expected to be minimal." (page V-10), is somewhat confusing. Does this mean that examination of benthic communities will be cursory? Or, does this mean that wastewater outfall will only effect benthic communities in a limited manner. Clarification of this point in your final statement seems desirable. 2

Appendix D:

This section seems to be rather academic, but well done, and appreciated. We believe that herb Epilobium angustifolium is fireweed. We are quite surprised that you did not find any Taxus brevifolia, or various species of the Genus Mimulus (monkey flowers) (Scrophulariaceae family) in the study area. 3

References:

It was of interest to note that one of your references is the Washington Environmental Atlas, by the U. S. Army Corps of Engineers. We recognize this as a valuable tool for many types of natural resource work. There may be some areas of your report where more extensive use of it could be advantageous. You do not mention that the Atlas indicates the study area to be a critical wildlife habitat (page 37 of the Atlas). In describing existing conditions it may be helpful to mention the life zone in which the study area exists (Humid Transitional Timbered, page 16 and "Life Zone Overlay" of the Atlas). It may also be beneficial to indicate in Appendix D those birds on the National Audubon Society's Blue List (page 40 of the Atlas).

Thank you for the opportunity to read and comment on your draft. We trust our comments will be given consideration during preparation of your final statement.

Sincerely,

THE DEPARTMENT OF GAME

E. S. Dziedzic

Eugene S. Dziedzic, Asst. Chief
Environmental Management Division

ESD:jb
cc: Fred Hosea
Agencies

Response to letter from State of Washington, Department of Game

1. Current design plans for the Keyport crossing include a trench to bury the pipeline and shield it from external damage. Pipeline construction materials under consideration include high-pressure PVC, a material that resists the corrosive effects of salt water and sewage constituents.

2. This was a typographical error. It was intended to say that the effects upon benthic communities from an ocean outfall would be minimal, given the level of treatment and dispersion characteristics estimated for the study area.

3. The plants have been added to the species list at your suggestion; we simply did not notice any during our survey.

DEPARTMENT OF GAME

600 North Capitol Way / Olympia, Washington 98504

Game Commission
Claude Bekins, Seattle, Chairman
Glenn Galbraith, Wellpinit
Frank L. Cassidy, Jr., Vancouver
Arthur S. Coffin, Yakima
Elizabeth W. Meadowcroft, Tacoma
Archie U. Mills, Wenatchee

Director / Carl N. Crouse
Assistant Directors Ralph W. Larson
Jack S. Wayland

March 22, 1976

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MAR 24 1976
EPA-

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA. 98101

Dear Mr. Thiel:

Your supplement to the draft environmental impact statement--Central Kitsap County, Washington, Wastewater Facilities, EPA Project C-530494-01--was reviewed by our staff as requested. Comments follow.

Your efforts to fully evaluate alternatives, as reflected by this supplement, are notable. As in our review of the original draft statement (correspondence of 9/19/75 to Richard R. Thiel), we found this supplement thorough and objective. Attention is given to the indirect and oftentimes elusive effects associated with wastewater facility improvements as well as the more primary impacts of construction and operation.

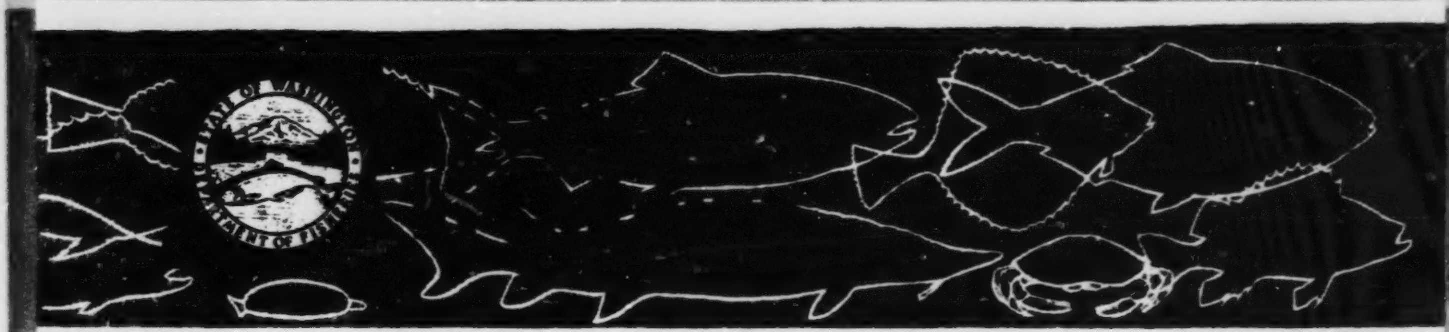
The discussion of growth-inducing impacts warrants comment. You seem to say that this project would respond to service needs brought about by growth induced by other causes (principally the Trident Project). This growth is expected in any case. Adverse impacts on wildlife resources associated with that growth will occur whether this proposal is implemented. While this may be so, we hasten to point out that a need still exists for full evaluation of wildlife impacts connected with population growth resulting from the Trident Project. To our knowledge, such secondary impacts have never been fully analyzed. For some time we have been participating in negotiations with the Navy. These negotiations are aimed toward finding means to accomplish full analysis of secondary wildlife impacts associated with the overall Trident Project and appropriate mitigation. To date, no settlement has yet been reached. We are concerned that wildlife needs not be forgotten as facilities (such as the proposed project) come on-line to meet other needs partially or wholly created by the Trident Project.

Thank you for the opportunity to review your supplement. We hope our comments will be helpful.

Sincerely,

THE DEPARTMENT OF GAME
E. S. Dziedzic
Eugene S. Dziedzic, Asst. Chief
Environmental Management Division

ESD:jt
cc: Hosea
Agencies



DANIEL J. EVANS
GOVERNOR

ROOM 115, GENERAL ADMINISTRATION BUILDING • PHONE 753-6600
OLYMPIA, WASHINGTON 98504

DONALD W. MOOS
DIRECTOR

October 20, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

Your Draft Environmental Impact Statement for the Central Kitsap County Wastewater Facilities has been reviewed. We have a few comments to offer for your consideration.

Our interests in the development of Kitsap County's wastewater facilities lie in the area of potential impact on fisheries resources. Your statement has done an excellent job in presenting existing conditions and in anticipating impact on Clear Creek and the marine receiving waters. Since we had the opportunity to contribute data in areas of concern during the development of the Draft Facilities Plan, there are only a few additional points we wish to cover.

It is stated that timing of the work that would disrupt the Clear Creek stream bed should avoid periods of salmon migration. We would add that damage to the stream bed or the addition of sediment during the periods of egg and fry incubation would also adversely affect fish production. While the same statement regarding timing was made in the Draft Facilities Plan, it was overlooked in our response to that document. 1

We also note that the recommended mitigative measures to protect Clear Creek include making pipeline crossings at locations where the creek is narrow and shallow (page V-6). Since the stream gradient of much of Clear Creek is moderately shallow, an area of such description might provide some of the better spawning bed material within the stream. A Hydraulic Projects Approval, jointly issued by the Departments of Game and Fisheries, should be obtained for this work and stream crossing sites should be specifically identified and evaluated at that time.

We are encouraged to learn that the water quality of Dyes Inlet should be improved with whichever alternate is selected. It should also be pointed out that a much greater improvement in Dyes Inlet water quality would be realized if the effluent is discharged into any of the other water bodies being considered. 2

In our earliest communications relative to development of this wastewater facilities plan, we favored effluent discharge in the more open areas, such as near

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Point Monroe or Manchester, and avoidance of the more confined inland bodies of water. Since that time, however, we have discovered some of the best beds of subtidal geoducks in Puget Sound located between Skiff Point and Point Monroe. These beds will support a substantial regulated geoduck harvest and we anticipate leases will be given in the near future. Therefore, we are very concerned about any impact that a discharge within this area, such as proposed in Alternatives 3 and 4, would have on this resource. Alternative 9, discharge at Manchester, appears to offer the most favorable circumstances for preserving the quality of the marine receiving waters. 3

In summarizing the discharge of treated effluent into Sinclair Inlet (Alternatives 6 and 7, pages I-7 and -8), it is stated that dilution is good and dispersion is fair. However, the model results cited on page II-41 state that there will be poor dispersal and mixing due to low current velocities. Some clarification would be helpful. 4

Thank you for the opportunity to review your well prepared draft statement. We hope these comments will be useful to you in preparation of the final EIS.

Sincerely,

Ray C. Johnson

Ray C. Johnson, Acting
Fisheries Environmental Coordinator

cc: Mike Mills, OPP&FM
D. L. Lundblad - Dept. of Ecology
E. S. Dziedzic - Dept. of Game

Response to letter from State of Washington, Department of Fisheries

1. A Hydraulic Projects Approval will be sought from the Department of Game and Fisheries along with additional recommended mitigative measures for all water crossings. It should be noted that the reccommended plan does not involve placement of an interceptor sewer along Clear Creek.

2. A greater improvement may not necesarily occur unless Bremerton ceases discharge into Port Washington Narrows. The recommended plan routes all study area sewage away from Dyes Inlet and would discharge the treated effluent into North Port Orchard channel, where flushing characteristics are far superior.

3. Preliminary unpublished results from the Bremerton Facilities Plan study indicate that a Manchester outfall could result in a greater return of diluted effluent to Port Orchard than had been expected. However, the recommended alternative would not discharge at Manchester or Point Monroe but in North Port Orchard channel. Protection of the commercial geoduck beds would have occurred by extending the outfall beyond the beds, but consideration of the beds and the potential aquatic park preserve at Fay Bainbridge helped lead to selection of the recommended plan.

4. Initial modeling results were subject to some variation in interpretation subject to the context of the statement. The field studies conducted by the University of Washington were designed to dispell some of the initial uncertainties, and the results are presented in Chapter 2 of the final EIS.

GOVERNOR
DANIEL J. EVANS

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CHARLES H. ODEGAARD

WASHINGTON STATE
PARKS & RECREATION COMMISSION

LOCATION: THURSTON AIRDUSTRIAL CENTER PHONE 753-5755
P. O. BOX 1128 OLYMPIA, WASHINGTON 98504

October 21, 1975

IN REPLY REFER TO:
35-2650-1820
Draft EIS -
Central Kitsap
County Wastewater
Facilities

Mr. Richard R. Thiel
U. S. Environmental
Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

The Washington State Parks and Recreation Commission has reviewed the above-noted document and has the following comments:

The Washington State Parks and Recreation Commission had previously reviewed the Draft Facilities Plan. A letter was written to Mr. Steve Fusco of the URS Company expressing our concerns with the Draft Facilities Plan. Our concerns remain after reading the Draft Environmental Impact Statement.

The following is essentially what the letter to URS from the Washington State Parks and Recreation Commission said:

"Plan No. 3P proposes an outfall somewhere in the vicinity of Fay Bainbridge State Park. State Parks would oppose an outfall on the tidelands owned by the Washington State Parks and Recreation Commission which front Fay Bainbridge State Park. Further, State Parks would oppose an outfall that would impact tidelands owned by the Commission. These tidelands are utilized by the public for swimming, clam digging and scuba diving. There is a proposal to create an artificial reef in front of Fay Bainbridge State Park to provide a fish habitat and point of interest for scuba divers. 1

The Washington State Parks and Recreation Commission requests that the interests of the recreating public be seriously considered when siting an outfall in this vicinity."

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Thank you for the opportunity to comment. If we can be of further assistance please let us know.

Sincerely,

David W. Heiser

David W. Heiser, Chief
Environmental Coordination

Arthur M. Skolnik

Arthur M. Skolnik
State Conservator

sg

Response to letter from State of Washington, Parks and Recreation Commission.

1. The outfall proposed in alternative 3P would be located several hundred yards south of the State Park. The depth of the outfall, at least 165 feet, and distance from the shoreline would make any travel of effluent back to the shoreline minimal. Secondary level treated effluent, after initial dilution within the mixing zone, would have a very negligible impact upon water quality and thus the Commission-owned tidelands.

   With regard to the proposal to create an artificial reef for fish habitat in that area, the diluted effluent would rise to the surface and have no noticeable effect upon submerged reefs. As a point of interest, fish have been frequently observed residing at the ocean outfall for primary effluent from the Seattle West Point facility. This situation does indicate that negative impacts should not necessarily be associated with outfalls.

   Finally, principally because of cost-effectiveness and, in some measure, the opposition by your agency, this alternative is not recommended.

   Following is an excerpt from "West Point Environmental Planning Study, Interim Report," by Metropolitan Engineers for Seattle Metro, April 1973. The excerpt refers to the discharge of primary level effluent and digested sewage sludge through an outfall into Puget Sound from the West Point treatment plant.

   > "Studies were conducted by METRO from 1966 (prior to startup of the West Point treatment plant) to 1968 to determine the effects of the West Point discharge on benthic organisms (bottom dwellers) and the extent of possible buildup of sludge materials in the vicinity of the outfall. Visual inspections of conditions in the vicinity of the outfall were conducted in 1968 and 1971. Further investigations of the benthic sediments and organisms in this vicinity will be conducted in 1973.
   >
   > "No measurable deposition of digested sludge was observed in the vicinity of the outfall in the studies conducted. Core samples of bottom sediments collected in 1966 through 1968 indicated no layering of materials and no definable buildup of organic material.
   >
   > "Comparisons of the abudnance of certain benthic fauna between 1966 and 1968 (preplant to postplant comparison) after two years of plant operations indicated minor variations in numbers. The numbers and areas involved were sporadic, however, and both positive and negative variations were observed, making interpretation difficult. In

any event no substantial change in benthic populations was observed. The aquatic fauna visually observed in the immediate vicinity of the outfall in both the 1968 and 1971 inspections appeared normal in both numbers and reaction to effluent from the treatment plant. In the 1971 inspection, sea anemone were observed attached to the ballast rock and diffuser itself, and three species of fish - ratfish, lingcod and copper rock fish - appeared to have taken up residence in the ballast rock surrounding the outfall."

GOVERNOR
DANIEL J. EVANS

COMMISSIONERS:
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DIRECTOR:
CHARLES H. ODEGAARD

WASHINGTON STATE
PARKS & RECREATION COMMISSION

LOCATION: THURSTON AIRDUSTRIAL CENTER
PHONE 753-5755
P. O. BOX 1128
OLYMPIA, WASHINGTON 98504

March 25, 1976

IN REPLY REFER TO:
35-2650-1820

Supplement to
Dr. EIS -
Central Kitsap
County, Washington,
Wastewater Facilities,
EPA Project C-530494-01

(E-502)

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

The Washington State Parks and Recreation Commission has reviewed the above-noted document and does not wish to make any comment.

Thank you for the opportunity to review and comment.

Sincerely,

David W. Heiser, Chief
Environmental Coordination

Arthur M. Skolnik
State Conservator

sg

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GOVERNOR
DANIEL J. EVANS
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WASHINGTON STATE
PARKS & RECREATION COMMISSION
LOCATION: THURSTON AIRDUSTRIAL CENTER
PHONE 753-5755
P. O. BOX 1128
OLYMPIA, WASHINGTON 98504

January 22, 1976

IN REPLY REFER TO:

Mr. Richard R. Thiel, P.E.
Chief, Environmental Impact Section
U. S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

We have reviewed the proposed wastewater facilities project in your Central Kitsap County EIS and find that it does not affect any properties on the State or National Registers of Historic Places nor are there properties in the project area that have been inventoried for their cultural value.

We have also reviewed the report of the Archaeological Reconnaissance in the Clear Creek Drainage, Eastern Kitsap Peninsula and concur with the conclusions reached by the investigating archaeologist that implementation of the proposed sewer line will have no negative effects on cultural resources in the project area. We suggest that the recommendation contained in the report, that if artifactual material is encountered during the course of construction, personnel should contact the Office of Public Archaeology and, in addition, the Office of Archaeology and Historic Preservation, be included in your final EIS.

Sincerely,

Arthur M. Skolnik

Arthur M. Skolnik
State Conservator

kb

WASHINGTON STATE
HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS

Highway Administration Building
Olympia, Washington 98504 (206) 753-6005

Daniel J. Evans - Governor
G.H. Andrews - Director

October 20, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Attention: 10A

Environmental Protection Agency
Central Kitsap County Waste-Water
  Facilities
Draft Environmental Statement

Dear Mr. Thiel:

Reference is made to your letter of September 5 requesting our review of the draft environmental statement for the above project.

We have completed our review and offer the following comments:

In conjunction with the Trident Support Site, the Department of Highways is currently planning to make improvements to county roads that will be crossed or paralleled by some of the alternate pipelines. We would encourage the coordination of planning and design of the proposed facilities with the Department to facilitate the construction of compatible projects.

We would hope that the final facility plan take into consideration any proposed highway work. We currently are preparing highway construction plans for the effected area and will be prepared to make them available to Kitsap County as soon as they are complete.

Coordination of planning efforts with the Department can be initiated by contacting Mr. V. W. Korf, District Engineer, P. O. Box 327, Olympia, Washington 98504.

Thank you for the opportunity to review this information.

Sincerely,

G. H. ANDREWS
Director of Highways

H. R. Goff

By: H. R. GOFF
Assistant Director for
Planning, Research and State Aid

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HRG:eh
RA/RBD
cc: V. W. Korf
    Mike Mills (OPP&FM)

r Ferguson, Chairman **Walla Walla** · *A. H. Parker* **Bremerton** · *Howard Sorensen* **Ellensburg** · *Virginia K. Gunby* **Seattle** · *Julia Butler Hansen* **Cathlamet** · *Harold I. Boula* **Secretary**

Response to letter from State of Washington, Highway Commission

The facilities planning consultant has assured that all pipeline construction would be coordinated with the Kitsap County Engineering Department and the Washington State Department of Highways.

PUGET SOUND
AIR POLLUTION
CONTROL AGENCY

410 West Harrison Street, Seattle, Washington 98119 (206) 344-7330

October 17, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Subject: Draft Environmental Impact Statement - Central Kitsap County Wastewater Facilities

Dear Mr. Thiel:

We have reviewed the Kitsap County Wastewater Facilities draft impact statement enclosed with your letter dated September 5, 1975.

The introduction of primary sewage treatment facilities should have no significant effects on ambient air quality, since you conclude that "project-induced population growth will not be significant." Dust generation during construction of pipeline and plant should be minimized by watering as needed to comply with this Agency's Regulation I.

Thank you for the opportunity to comment.

Very truly yours,

A. R. Dammkoehler
Air Pollution Control Officer

By: J. R. Pearson
Senior Air Pollution Engineer

ARD:JRP:et

SERVING:

KING COUNTY
410 West Harrison St.
Seattle, 98119
(206) 344-7330

KITSAP COUNTY
Dial Operator for Toll
Free Number Zenith 8385
Bainbridge Island,
Dial 344-7330

PIERCE COUNTY
213 Hess Building
Tacoma, 98402
(206) 383-5851

SNOHOMISH COUNTY
506 Medical-Dental Bldg.
Everett, 98201
(206) 259-0288

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PUGET SOUND
AIR POLLUTION
CONTROL AGENCY

410 West Harrison Street, P.O. Box 9863 (206) 344-7330
Seattle, Washington 98109

March 22, 1976

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
U. S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Subject: Central Kitsap County Waste Water Facilities
Supplement to Draft E.I.S.

Dear Mr. Thiel:

This Agency believes that the additional alternative and the revisions in the statement shown in the supplement do not affect our earlier conclusions about the air quality effects of the project. Therefore, we will have no further comment to offer in addition to the previous comments made in our letter of October 17, 1975.

Very truly yours,

A. R. Dammkoehler
Air Pollution Control Officer

By: J. R. Pearson
Senior Air Pollution Engineer

JRP:wb

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Bert L. Cole
COMMISSIONER OF PUBLIC LANDS

November 10, 1975

Mr. Clifford V. Smith, Jr., Regional Administrator
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Smith:

The draft environmental impact statement for the proposed Central Kitsap Waste Water Disposal Facility has been reviewed by my Marineland Management Division. We wish to submit the following comments regarding this proposal:

Alternative 7 appears to be the alternative with the least potential for adverse impact on State managed shorelands, tidelands and beds of navigable waters.

Alternatives 1 and 2 provide poor locations for sewer outfalls due to incomplete flushing action in Dyes Inlet and the presence of clam beds in this area.

While Alternatives 3 and 4 have better flushing action than 1 and 2, there are commercial goeduck beds located in this vicinity that could be adversely impacted.

Alternative 6 would likely have less impact than 1 and 2 but the outfall in Dyes Inlet would have the potential for polluting the clam beds in the Inlet.

Alternatives 8 and 9 would have the potential for creating pollution problems for recreation sites located near these outfalls.

The impact statement does not predict what toxic substances, if any, might enter the system from the U. S. Naval Reservation. Until these possible impacts are discussed, it is impossible to adequately assess the environmental effects. 1

We appreciate having an opportunity to review this statement.

Yours truly,

Bert Cole

BERT L. COLE
Commissioner of Public Lands

BLC:wbe

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Response to letter from State of Washington, Commissioner of Public Lands

1. Chapter 3 of the final EIS states which pollutants might be present in industrial wastes from the Trident Support Site and what type of domestic waste is expected. A more accurate assessment cannot be presented in the absence of further information from the U.S. Navy. It is our belief that this does not indicate secrecy on the U.S. Navy's part but rather their own lack of knowledge at this stage of their planning. However, we also feel that the U.S. Navy is sincere in their intent to obey Federal regulations and pretreat their industrial wastes to a level compatible with Kitsap County's treatment facility. The National Pollutant Discharge Elimination System (NPDES) permit to be issued by the State Department of Ecology will include pretreatment requirements if industrial waste constituents are included in the Navy's contribution. See also the discussion of mitigative measures in Chapter V of the final EIS.

Grand Central on the Park • 216 First Avenue So. • Seattle, Washington 98104 • 206/464-7090
Puget Sound Governmental Conference
as of July 1, 1975 - Puget Sound Council of Governments

October 7, 1975

Richard R. Thiel, Chief
Environmental Impact Section, MS-443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Subject: Draft Environmental Impact Statement for Proposed
Central Kitsap County Wastewater Facilities
PSCOG File # KT/9706/75

Dear Mr. Thiel:

Thank you for the opportunity to review the subject draft environmental impact statement. We appreciate your effort to get input at an early stage prior to selection of an alternative and our comments at this point are directed at questions which should be answered before that recommendation is made. It is our feeling, though, that once the selection of a project has been made based on an analysis of the alternatives, more detailed information should be circulated for review and comment.

The following comments have been endorsed by the Kitsap County Subregional Committee of this agency and are offered for your consideration in the preparation of a final impact statement.

1. The EIS identifies urban sprawl as the major secondary impact to be expected from the project, however, the supporting analysis of mitigating measures in weak (page xii). Should the recommendation of "limiting sewer size, access and location" be taken to mean that EPA's policy is to consider the provision, limitation and access to sewers as the controlling factor in urban development? If so, a statement to this effect should be included in the EIS. 1

2. On page 1-5, the Dyes Inlet outfall is evaluated as "fair". The mixing/assimilation capacity of this option should be quantified and compared to anticipated future discharge volumes. 2

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3. The data on page A-6 should be more prominently presented. The statement, "It was felt that the sub-category items received equal weight", seems somewhat superficial. Are there no special cases? 3

4. Regarding the discussion on page II-40, what is the waste concentration once "equilibrium is achieved", and is a possible error or "an order or magnitude" accurate?

   Again, it appears that samples are tested to determine how diluted they become, when the question should begin with the loading to be imposed vs. assimilation capacity. Will the assumed dilution be achieved when one mgd are discharged? What about ten mgd? Also, what evidence is there that dye-release accurately simulates dispersion of wastes at the point of outfall? 4

   The 1995 estimated design flow is 3.9 mgd (page III-4). After secondary treatment, the waste concentration of BOD should be 45 mg/e (weekly average). For a dilution ratio of 100:1 to occur in Dyes Inlet, an exchange of 3.9 mgd x 100 is required daily, but the flow in and out of the inlet is not given.

   The figure on page III-4 of 15 gpcd for infiltration appears small. Assuming 500 gal/acre/day, (highly optimistic for Kitsap County soils) and a density of 3 du's/acre and 3.3 persons/du, a population of 24,000 would require 2,400 acres. This figure, multiplied by 500 gal/acre/day, results in 12,000 gallons or 50 gal. capita/day. This will substantially change the loading requirements placed on the treatment plant. 5

5. How does the project relate to the Sinclar Inlet Section 201 study currently underway? What are the plans for coordination with that study? 6

Thank you again for the opportunity to review the draft statement. I hope our comments will be useful to you.

Very truly yours,

Mart Kask
Executive Director

Response to letter from Puget Sound Governmental Conference

1. The draft EIS points out that areas undergoing development can be influenced by regulating access to sewer lines, and that mitigation of a potential impact—uncontrolled development—can be promoted by such regulation. Such decisions are local, not Federal. It is not the policy of EPA to consider sewer access to be the controlling factor in urban development.

2. See response to comment 4.

3. The weights used in the public opinion survey were derived from a study done by URS Co., the facilities planners. This study, which identified concerns of the public, was used as the basis for deriving the weights according to the table on page A-6. The survey was not detailed enough to derive sub-category items, which were, therefore, considered to be equal. It should be noted that the ranking of the alternatives is the same for both sets of weighting factors.

4. Equilibrium dilutions for the various outfall sites under consideration vary from a minimum of 5,800 in Sinclair Inlet to a maximum of 26,500 in Dyes Inlet. These dilution ratios are based upon a 1-mgd discharge and assume complete mixing with the incoming tidal volume. Corresponding dilutions for 10 mgd would be 580 and 2,650, respectively. These estimates may well be inaccurate by two orders of magnitude, particularly in the vicinity of the outfall. Waste concentrations in the receiving water can be found by dividing the effluent concentrations by the dilution. See Table II-14.

   Drogue studies conducted by the University of Washington in the prototype appear to verify dye studies performed in the hydraulic model at the Point Monroe, North Port Orchard and Dyes Inlet sites. Agreement was best at the Point Monroe and North Port Orchard sites.

   The tidal flow in and out of Dyes Inlet is, on the average, 1.391 x 10^9 cubic feet per tidal cycle. This corresponds to an average flow of 31,160 cubic feet/second.

5. The average sewage flow rate of 100 gpcd was a value measured at Firglade, Parkwood East and Kariotis during an infiltration study conducted by the URS Company in 1974. Somewhat higher rates were measured in Silverdale; however, Silverdale is currently accepting bids from contractors for a sewer rehabilitation program that will greatly lower infiltration rates.

6. Kitsap County has been keenly aware of the status and activities on the Sinclair Inlet 201 Facilities Plan. Their consultant has also coordinated very closely with the Sinclair Inlet facilities planning

consultant and the City of Bremerton.

The following is an excerpt from a memorandum detailing the minutes of a meeting between study area consultants and the Sinclair Inlet Section 201 consultants held on 19 December 1975 in EPA's offices in Seattle.

> "The present status of the Sinclair Inlet Facilities Plan is as follows: Initial data-gathering is essentially complete; overall the Facilities Plan is approximately 30% completed. Alternatives have been conceptualized; however, not studied in great detail. Their draft Facilities Plan is due July 1, a hearing in early August, and the final Facilities Plan due in mid-November. There is presently little or no public controversy over the Sinclair Inlet Facilities Plan; concerns are mainly localized. A decision by Kitsap County as to which alternative to select for their project and a decision that excludes the Bremerton planning area would fit into their schedule for completion of their facilities plan and would not delay their planning study.
>
> "In summary, it appears that there has been adequate coordination between the two consultants and the County and the City of Bremerton in the planning underway in these two separate Facilities Plans. Costs have been interchanged in the evaluation of common alternatives. Since the regional alternative has been studied to Bremerton's satisfaction in the Central Kitsap County Facilities Plan, there is no reason to belabor further the consideration of a large regional plant. The City of Bremerton will have an opportunity to comment in detail on the final Facilities Plan when it is released by URS Company for the county."

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IN REPLY REFER TO
OUR FILE NO.

October 20, 1975

Mr. Richard R. Thiel
Chief Enivornmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Dear Dick:

We appreciate the opportunity EPA Region X has provided all citizens of Kitsap County to systematically examine the environmental factors related to the possible Central Kitsap County Waste Disposal Facilities. In addition to the previous oral comments and letters regarding the project, detailed comments on the draft EIS (reference EPA Project No. C-530494-01) are enclosed. These comments have endengered certain general observations which follow. These and the other comments have been prepared and are submitted on behalf of our client Mr. C. A. Ross of Silverdale, Washington.

The content of the Draft EIS does reflect most unfortunately certain constraints on the document preparation which appear to be due to certain assumed but not stated timetable constraints. For example, no data on benthic organisms is available (see p. II-49) but the conclusion is drawn elsewhere in the EIS that there will be a negligible impact upon bentic organisms (see p. IV-21). It well may be true that some of these difficulties will be mitigated when the necessary EIS Supplements are prepared to analyze the environmental impacts and the alternatives for the specific project (if any) that is selected. But there is little doubt that the timetable may be constrained and inadequate analysis available now because of a fundamental assumption in the Draft EIS -- that being that the Trident wastes of 2 mgd must and will be (?) handled

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by the proposed project and on the Trident timetable. This presumption has unfortunately rendered the Draft EIS inadequate in the consideration of reasonable alternatives. Should the Trident wastes be handled by an upgraded facility? Should Trident industrial wastes be treated on the base and recycled to protect a depletable natural resource, i.e. water? Should Central Kitsap County facilities be constructed to service Trident on the timetable and level of deployment assumed in its own EIS? Should regionalization of waste treatment facilities and coordination to the maximum extent practicable with other existing or upgraded facilities be goals more appropriate to this project than timetable adherence? If so, the sites near Brownsville and by Enetai should be deleted from further consideration. The draft EIS itself appears to support a disposal site only on the east side of Bainbridge Island or by Bremerton.

These issues relate to another significant area of concern illustrated by the Draft EIS's assumption on costs. Municipal bonds are assumed to be able to be sold at 5-7/8% which is approximately 1-1/2% to 2% below existing market rates. Besides this inaccuracy, no statement is made that the Navy will guarantee paying 51% of the total costs regardless of any actual flow of waste to the facility (see p. III-IV, Navy Flow of 2 mgd out of 3.9 mgd average flow in 1995). What is the impact upon the taxpayers of Kitsap County under the proposed project and all reasonable alternatives thereto including separate handling of the Trident wastes? Land speculation itself resulting from the acknowledged growth inducement of the proposed facility can and does cause tax increases by increasing appraised values; but this impact on the taxpayer is ignored. Even the mechanism by which the facility is to be funded is ignored by presuming the use of County bonds. What are the factors involved in analyzing the socio-economic impacts upon the ratepayers or taxpayers when selecting a different operating alternative such as a local improvement district, a public utility district or the City of Bremerton?

The planning exposed in the Draft EIS is important; and it is a good start. But concurrent efforts to adopt land use plans and criteria governing population expansion into certain land areas is treated so preliminarily so as to mislead the average citizen into thinking the problem has been addressed. The Draft EIS's introduction notes that Kitsap County may preserve rural areas and direct growth by limiting sewer size access and location (see xii). Yet the criteria and their reasonable alternatives for these factors are not spelled out and analyzed. How can the project be specified until such studies are done and policies are determined unless we are only to lock the barn door after the horse is stolen? Will not the choice for the Silverdale area of (1) doing nothing, (2) planning for Trident growth, (3) creating a new city of 11,000 people north of Island Lake, or (4) urbanizing Silverdale to significantly change the environmental analysis for the sewer project?

For such a significant investment of funds as the project entails, premature decisions to adhere to a timetable in lieu of developing adequate land use policies, in completing the Bremerton study for treatment of its present wastes, and in analyzing the proposed project with and without the Trident facility is unreasonable for any reasonable decision-maker.

We hope that the enclosed comments are of assistance to you in your continued anlysis. We deeply appreciate the efforts the Environmental Protection Agency has expended to assure an adequate, open and comprehensive decision making process.

Yours truly,

HOUGHTON CLUCK COUGHLIN & RILEY

Joel Haggard

JH:mn
Enclosure
cc: Mr. C. A. Ross w/enc.
    Comm. Frank Randall w/enc.

COMMENTS UPON DRAFT ENVIRONMENTAL IMPACT STATEMENT

CENTRAL KITSAP COUNTY WASTE WATER FACILITIES

EPA PROJECT NO. C-530494-01

1. Re page x, ¶4: As the proposed project's site has not been selected and the site specific impacts have yet to be analyzed, is it the county or EPA that will supplement this EIS for the environmental analysis of the specific project routing of all lines, project configurations and the discharge?

2. Re page xi, ¶4: EPA has indicated that one impact would be that a mechanism for locating anticipated growth within the study area will result. What criteria have been adopted by the local governmental bodies for locating anticipated growth? In what measure is the anticipated growth associated with this project inconsistent with those criteria?

3. Re page xii: The EIS presumptively incorporates the waste loads from the Trident facility without an examination of the alternative of excluding the Trident generated wastes from the proposed facility. In what manner would the environmental impacts differ if the Trident generated waste loads were not incorporated into the proposed facilities and instead were handled completely on the base with the necessary upgraded sewage treatment systems?

4. Re page xii, ¶C: As significant increases in local property taxes are likely to result from the construction and operation of a waste water management system, what would be the impact upon the local property taxes as a result of any premature termination or project stretch-out for the Trident project. In addition, in what manner will Value Analysis be used in the design of the project to reduce the cost impact upon the tax and rate payers?

5. Re page xii, second paragraph under paragraph d: Since the potential for major adverse secondary impacts exist in the area of population location but have not yet been confirmed, what further studies in detail are required as part of the continuing effort to mitigate or eliminate these

adverse secondary impacts. As the project proceeds the draft EIS also indicates that the county officials may, by limiting sewer size access and location, have a method by which natural rural areas can be preserved and growth directed into urban and transitional zones. What rationale or criteria will be utilized by the Kitsap County officials in so limiting sewer size, access and location and have they made a commitment to so do this in accordance with criteria for direction of urban and transitional growth areas?

6. Re page I-1, second paragraph: The environmental impact statement alone does not fulfill EPA's total responsibilities under the National Environmental Policy Act. The EIS is directed solely to the requirements of Section 102(C) of NEPA and does not relate to the continuing requirement to study unresolved conflicts in Section 102(D), nor does it necessarily fulfill EPA's responsibility under Section 101 which requires coordination to the maximum extent practicable to fulfill the goal, among other things, that EPA is a trustee of the environment for future generations. In what manner does EPA intend to fulfill these other responsibilities of the National Environmental Policy Act for this particular project?

7. Re page I-1, last sentence: What would be the environmental effects anticipated from an upgrading of the sewage treatment facilities at the Trident support site so as to engender their ability to handle the population influx?

8. Re page I-2, last paragraph: Kitsap County, as a municipal corporation subject to the requirements of the State Environmental Policy Act, RCW 43.21C, is required to prepare an environmental impact statement for the proposed action. The State Environmental Policy Act permits that to the extent that there is an adequate environmental impact statement prepared by a federal agency to utilize that in lieu of one prepared by their own. The EPA environmental impact statement is inadequate for all project aspects other than selection of the alternatives discussed therein as modified by the comments of this letter. While the county may have prepared an environmental assessment in its facilities plan for use by EPA in the preparation of this document, that environmental assessment is not sufficient or adequate for compliance with the State Environmental Policy Act.

9. Re page I-4, first paragraph: Have there been any subsequent studies or new information developed which identify other or more severe adverse impacts associated with the Trident project since the time that reference 2 was published? To what extent has EPA independently considered the environmental analysis and conclusions of the Trident EIS?

10. Re page I-4, second paragraph: It is noted that the entire facilities plan would require reassessment if for some reason Trident were not to proceed. Would a similar reassessment be required as a result of a change in either the time schedule for construction of Trident or due to development of the Trident facility to handle more or less than 20 boats?

11. Re page I-4, last paragraph: With respect to the issues identified as major issues of the project, what further studies are required to provide a reasonable data base for environmental analysis of the anticipated primary and secondary impacts associated with these major issues?

12. Re page I-5: Again the concern for presuming that the Trident waste will be incorporated is unacceptable to an environmental analysis considering all reasonable alternatives. What would be the environmental impacts upon the alternatives identified if the Trident support site wastes were collected and treated at an upgraded waste water treatment facility located on the base? What would be the environmental impacts associated with the alternative of Trident wastes being handled totally on the base?

13. Re page I-5, second paragraph: The draft EIS notes that population growth within the study area and associated demands upon utilities and municipal services are concluded to be primarily due to the development of the Trident support site and the project induced growth will be negligible. What is the basis for this conclusion? Similarly, what is the basis for the statement that the sewerage systems of each alternative will have a tendency to concentrate future growth near sewer lines? Are any further studies necessary to evaluate the environmental impacts associated with the sewerage systems induced growth in the area?

14. Re page I-5, third paragraph: What specific documents identify the careful construction techniques that should be

utilized and will these documents serve as the basis for a condition in any grant to so require the diligent application of them?

15. Re page I-5, fourth paragraph: It is noted that water quality criteria should be met consistently. Is this restricted to the numerical criteria in the WAC 173-201-030 water quality criteria or does it also include the criteria that whenever the receiving waters of a classified area are of a higher quality than the criteria assigned for said area, the existing water quality shall constitute water quality criteria. See WAC 173-201-040(6).

16. Re page I-5, last paragraph: In concluding that alternative plan number 1 has the lowest project cost, to what extent has the cost analysis requirements of applicable EPA regulations been used?

17. Re page I-6, second paragraph: What is the meaning (qualitative and quantitative) to be applied to the term "fair" and to the term "good" in describing "mixing and dilution of effluent" and to the term "subsequent dispersion and flushing."

18. Re page I-5 and following: What are the environmental effects and alternatives associated with the alternative identified by John Strasburger in his letter of October 2, 1975, addressed to Mr. Steve Fusco of URS? That alternative involves the possibility of Poulsbo sewage being piped across the Lemmolo-Keyport Narrows to be joined with the Trident sewage near Keyport. In addition, what are the environmental impacts associated with the alternative identified in the September 26, 1975 memo by Steve Fusco of URS to the citizen advisory group relating to Poulsbo being regionalized with the Central Kitsap County Facility (along with the community of Keyport and the Keyport Naval installation) with subsequent discharge to be either on the east side of Bainbridge Island or piped south to Bremerton.

19. Re page I-5 and following: Since the submarine outfall has not yet been designed, what criteria will govern the design of the outfall and what site specific studies will be necessary to adequately analyze the environmental impacts associated with such an outfall?

20. Re page I-5 and following: Is there some point where the cost as a function of volume treated breaks down so that the economy of scale cannot be realized?

21. Re page I-5 and following: What is the anticipated cost for increasing the dispersion and flushing to increase the result from "fair" to "good"; and to increase the dispersion and flushing to maintain existing water quality criteria?

22. Re page I-9, fifth paragraph: Why was not the project alternative of handling all Trident wastes separately covered? In addition, since project modification, specific mains and collector lines, routings and discharge site specific impacts have not been discussed, will EPA prepare a supplemental EIS to discuss these factors of the proposed action?

23. Re page I-11: To what extent have the project ratings been quantitatively or qualitatively adjusted to reflect conformance with the NEPA and SEPA requirement that to the maximum extent practicable, the plans, programs and functions of governmental units should be coordinated to accomplish, among other things, the governmental responsibility of trustee of the environment for future generations?

24. Re page I-12: The graphical display presented is unique and well done.

25. Re page II-1: The entire environmental setting described in chapter 2 appears to be so general as to ignore site specific characteristics. What additional studies will be done to identify, analyze and mitigate site specific variations and impacts from the general environmental setting described in chapter 2?

26. Re page II-1, second paragraph: Why was the alternative of excluding portions of sub-basin 12 and 13 from this document and including it with the entire Bangor annex to the Keyport Naval torpedo station not been considered? What are the environmental effects associated with this alternative and how does this variation affect the alternatives described herein?

27. Re page II-2: To what extent is reference 3 inadequate and what is EPA's judgment with respect to the environmental consequences identified in reference 3, as applied to this project?

28. Re page II-3: Since a possible disposal site is to be located on the east side of Bainbridge Island, what is the environmental setting for this area both on land and in the water?

29. Re page II-8: What areas are contemplated to be sewered and what criteria will govern the definition of areas to be sewered? Will soils, growth and environmental impact all be considered and if so by what specific criteria?

30. Re page II-11: What additional studies of air pollutant emissions and mitigating measures might be required should be done particularly in the area of determining areas to be sewered, since it is admitted that the proposed project can have a major adverse secondary impact in determining population location areas.

31. Re page II-14: Since Table II-14 identifies in sites 6 and 11 the probability of significant adverse effect upon people due to noise, what mitigating measurers might be employed in sewering these areas so as to mitigate the future growth?

32. Re page II-15, second paragraph: What is the synergistic effect of the effluent characteristics from the proposed facilities with other unexplained toxic discharges, particularly those recently discussed in the newspaper with respect to the Keyport-Lemmola area?

33. Re page II-21: To what extent will the growth induced by the proposed sewer project increase the demand upon ground water as a result of population relocation or augmentation?

34. Re page II-33: What assumptions have been made as to the physical dimensions of the mixing zone which is qualitatively described in the State of Washington's water quality standards? How will the discharges interfere with biological communities or populations of important species to a degree which is damaging to the eco-system? What biological communities or populations are important species

in each of the outfall areas? In addition, to what extent will the effluent diminish other beneficial uses disproportionately?

35. Re page II-33, first paragraph: Aesthetic values in the water quality criteria apply within the mixing zone. To what extent will these criteria be satisfied or effected as a result of the discharges?

36. Re page II-33, second paragraph: It is stated that some of the alternatives may require further treatment in order to meet water quality standards. By the term "water quality standards" is the requirement that the existing water quality shall constitute water quality criteria if better than that criteria assigned for the area included in this consideration? In addition, to what extent has the cost for each of the alternatives been identified to meet these objectives?

37. Re page II-35, second paragraph: It is noted that Port Orchard area has frequent violations of bacteriological and turbidity standards in the Burke Bay/Brownsville area? The sixth paragraph on this page notes that these local bacteriological problems are in those areas which are subject to only mild flushing. Since the facilities planning consultant did not select the Burke Bay/Brownsville area of Port Orchard as a major disposal site alternative, (See page II-41 in the last paragraph) should not this alternative be eliminated from further consideration?

38. Re page II-36, second paragraph: To what extent is the acute biological shock condition or water quality criteria affected as a result of reconcentration of effluent due to tidal action?

39. Re page II-36, third paragraph: It is stated that "presumably such simulations will be made in the future." Who will make these simulations and will they be done or is this just a faint hope? Further, with respect to the fourth paragraph on page II-36, what additional studies are needed before the outfall site is selected?

40. Re page II-37, top of page: What verification of the model will be utilized at a specific site when examining the alternative configurations and locations of the specific discharge?

41. Re page II-38, first paragraph: What is the basis for the acceptability of the minimum effective depth selected, the minimum reasonable rule of thumb regarding diffuser length and the minimum current speed across the diffuser?

42. Re page II-38, Table IV-13: In light of the high average percent of time current speeds are less than 0.1 knotts for the Dyes Inlet, the Port Orchard Enetai and the North Port Orchard sites, what additional cost will be required to assure that discharges will not degrade existing water quality or have an adverse impact upon the aquatic biota?

43. Re page II-39, Table IV-14: How large a mixing zone has been assumed in identifying the location of the diluted 100 to 1 secondary effluent waste concentration?

44. Re page II-39, first paragraph: It is noted that in the interim reports the Point Jefferson site is probably the best within the study area with respect to mixing and dispersal. What is the anticipated cost impact on the other alternatives to increase their mixing and dispersal characteristics to that which would yield similar effects off Point Jefferson?

45. Re page II-40, first paragraph: As noted in the third paragraph on page II-41, current velocities at Port Orchard/Enetai as in the rest of Port Orchard are very weak and it could lead to erroneous conclusions in modeling. On what basis then can one rely upon the analysis of the effluent mixing at the site north of Port Orchard? The second paragraph on page II-40 indicates that calculations were made to confirm the good mixing but these calculations were based upon assumptions. Further, the third paragraph on page II-40 recommends that if either of the two sites in Port Orchard are given serious consideration a field dye study of the area be made to determine actual feasibility. Before any selection of these sites for further consideration is made, the dye study should be a prerequisite. Alternatively, it may be appropriate as a result of the analysis contained in the draft EIS and other documents to disregard in further work the discharge locations in Port Orchard at the area north of Brownsville and at Enetai.

46. Re page II-41, last paragraph: The rating of sites from the point of view of waste dispersion includes the north Port Orchard site. Yet the beginning of the paragraph, in identifying the major disposal site alternatives that should have further detailed investigation, ignored and deleted this site. Why then has it been included for further consideration.

47. Re page II-49, Table II-16: Since there is no data available on benthic organisms at Site C or Site J, how could anyone make a conclusion that there will a negligible effect upon the benthic community as is concluded on page IV-21?

48. Re page II-54: What is the effect of the effluent from the discharge alternative located north of Brownsville upon salmonids utilizing Steel Creek? Have the migration patterns of the juvenile and adult salmonids in the area north of Steel Creek been identified?

49. Re page II-60: To what extent has EPA coordinated under the requirements of Section 101 of the National Environmental Policy Act the planning for other water and sewage systems in the area insofar as they might have an impact upon or a relationship to the proposed Central Kitsap County Disposal?

50. Re page II-63: What are the anticipated volumes, characteristics and disposal methods for the sludge resulting from the proposed facility?

51. Re page II-65, first paragraph: Since the existence of Trident was assumed, how can an objective analysis of the impact due to premature termination of Trident, project stretch-out of Trident, or development of Trident at more or less than the planned boat level be accurately considered with respect to the growth inducement impacts associated with the proposed action?

52. Re page II-67: In what manner will the data given in Table II-22 be affected by the provision of sewers in the area?

53. Re page II-72: What is the impact of sewer rates upon the 11.9% of the total county population classified as "near poor" and the 6.1% of the county population classified as "poor poor"?

54. Re page II-76: To what extent have the impacts identified in these pages been reviewed to consider the alternative of having all construction housing for the Trident facility located on the base?

55. Re page II-77: What further continuing studies should be made of population developments in the area prior to the determination of the proposed project capacity?

56. Re page II-77: It is stated that the study area will contain 47% of the population increase of Kitsap County. In what manner is this consistent with present plans or contemplated plans of the county and in what manner should this population be controlled by the areas to be sewered?

57. Re page II-78: Will the final environmental impact statement include in an analysis and revision to incorporate definite results of the A. D. Little, Incorporated population projection study?

58. Re page II-79: In what manner will the criteria for areas to be sewered reflect the land use plan identified in Figure II-14?

59. Re page II-80: In what manner will the criteria for determining areas to be sewered take into account the restriction of the 47% population increase into the transition or urban areas identified in Figure II-15?

60. Re page II-82: Whether the individual collector lines to be tied into the mains are to be funded by EPA or not, the environmental effects associated with alternatives for collector line areas should be identified and considered.

61. Re page III-1, second paragraph: It has been predicted that only 18,000 persons would be connected to the ultimate sewerage system. What areas will not be covered and what impact upon urbanization and growth will result from such restriction?

62. Re page III-4, top of page: Since it is indicated that population estimates will be resolved prior to release of the final EIS, we would appreciate an identification in the final EIS as to where these revised population estimates have affected the analysis.

63. The 20 year design flow for 1995 is estimated to include 85 gallons per persons per day of average dry weather flow. This apparently means that approximately 1.61 mgd would be the flow in 1995 for a population of about 18,000 persons or less. If this is correct, why does the estimated average daily dry weather sewage flow for the Poulsbo area identified on page III-6 indicate that they will have a greater per capita dry weather sewage flow generated per person than for the study area? In addition, since the Trident support site will generate the majority of wastes to be treated, will the payments to be made by the Navy for the operation and construction of the facility be based upon a fixed payment or will it vary with some actual flow? If it is the latter, what is the impact upon the rate payers due to such things as premature termination of the project eliminating all flow and thus all payments, or of lower flows as a result of project stretch-out or lower size project development?

64. Re page III-4, third paragraph: It is noted that the U.S. Navy projection of 2 mgd of average daily flow from the Trident support site is based on the total absence of detailed data. We would assume that the Navy will provide this information on a detailed basis for purposes of analysis prior to the preparation of the final EIS.

65. Re page III-7, first paragraph: What coordination by EPA (pursuant to the requirements of Section 101 of NEPA) have taken place with respect to the planning activities currently being undergone by the City of Bremerton? What is proposed as to effecting a relationship between those plans and the alternatives identified in this draft EIS?

66. Re page III-11, second paragraph: It is noted that the facilities planners and the EIS staff have assumed that the Hansville Road solid waste disposal site or similar one would be available for sewage sludge disposal. This is totally inadequate for an environmental analysis of the impacts upon disposal site life time, animal feeding effects, and ground water impact due to sludge disposal. What are the environmental impacts identified with or associated with the proposed central Kitsap County waste water facility considering the reasonable variation in volumes of sludge to be produced over the lifetime of the proposed facility? What further studies should be made to determine the impact

of the site specific effects of leachate upon ground water, of heavy metal concentration, etc.? Will the oxygen activated sludge waste water treatment system dictated in EPA 625/4-73-003a document be considered as a sludge treatment alternative?

67. Re page III-16, last paragraph: It is noted that the exact length and specific location of the outfall and diffuser have not been determined for alternative number 5 and that this is awaiting further studies on local water current being conducted by the University of Washington. Has the cost evaluation of this alternative reflected the probable range of additional work or design features required to produce an effluent which will not degrade water quality or have an adverse impact upon the aquatic biota? Will these studies be available and considered in the final EIS prior to the selection of another alternative?

68. Re page III-28, second and third paragraph: The alternative of no action should consider the impact of not treating any of the Trident base generated wastes and should also consider the alternatives for the areas to be or not to be sewered. As stands, this portion of the EIS draft is totally inadequate for a reasonable examination of alternatives.

69. Re page III-29: What is the impact of collector line installation costs upon the total annual cost? At some point in the document it was identified that the bonds could be sold for 5 7/8%. In light of the current market this is probably between 1 1/2% and 2% below current rates for municipal bonds.

70. Re page IV-3: It is indicated that dust and particulates raised during construction activities can be reduced by following EPA published guidelines for minimizing fugitive dusts from construction sources. What are these published guidelines and will they be adhered to in the construction of the project?

71. Re page IV-21: It appears to be totally irresponsible to conclude that there will be negligible effects on the benthic community when there is no data available as identified on page II-49. In addition, what is the effect of the effluent at the Manchester outfall upon the dense pockets

of the small clam as well as upon the salmonids that may be migrating to or from Steel Creek?

72. Re page IV-38: In this analysis it was assumed that discharges meet water quality standards. What are the costs associated with making this assumption a certainty due to the site specific characteristics? Has the analysist considered that water quality standards also include the requirement of nondegradation of existing water quality in making this assumption and analysis of impact? Has the nitrification of the effluent to reduce ammonia impact been considered in the total cost? What treatment will be utilized to reduce chlorine concentration at the point of discharge since minimum levels of chlorine can have a toxic effect upon aquatic biota. Has consideration of waste reconcentration as a result of tidal reversals or stagnation been considered? If not, what is the impact?

73. Re page IV-47; This page identifies and evaluates the degree to which the proposed project affects commercial and sports fisheries, including effects on mollusc abundance. Where is the analysis for the specific sites for discharge alternatives 3, 4 and 9?

74. Re page IV-59: Has the estimated operating and maintenance costs included the capital amortization of special efforts required to avoid nondegradation of water quality at each of the specific sites been considered. Has the estimated operating and maintenance costs assumed 2 mgd of waste originating with the Trident site will actually be delivered? If less than 2 mgd actually flows from the Trident site, is it anticipated that the taxpayers will have increased costs levied against them due to a rate reduction payable by the Navy?

75. Re page IV-61: The assumption of a $15,000,000 or so bond issue for 20 year maturity at an interest rate of 5 7/8% is totally unrealistic in light of current tax free municipal bond rates. What is the impact upon the cost of a realistic interest rate being utilized?

76. Re page IV-70: What is the impact upon the taxpayer as a result of the anticipated tax increase if the Trident support site wastes are not included in the proposed facility?

77. Re page IV-73, top of page: What would be the impact from the alternatives if the Navy were to house all construction personnel on base?

Response to letter of October 20, 1975 from Mr. Joel Haggard

The general comments of this letter cover many subjects in a short space. Since it would be extremely difficult to answer the general content of the letter, and inasmuch as an attachment prepared by Mr. Haggard reflects the contents of the letter in the form of specific, numbered comments, response is made to the attachment. This response will also answer the general comments of the letter.

1. The EPA has prepared a draft supplement EIS and a final EIS which contain more site-specific information and show a recommended alternative. The investigative level of effort is considered to be more than adequate to provide a data base for the selection of an alternative.

2. No specific criteria have been adopted by local governmental bodies for locating anticipated growth. No decision to follow such a course of action has yet been made. Only the Kitsap County land use plan exists at this time. As the County amends its comprehensive plan, it is anticipated that the A.D. Little study recommendations regarding urban concentration will be followed.

3. The presumption is incorrect; the alternative of excluding the Trident-generated wastes from the proposed Central Kitsap County facility was considered. With separate treatment by the Navy, there would be no construction of an interceptor from the Bangor base to the Central Kitsap County facility and, therefore, no impact. For the County's alternative 4a, there would be little change since the anticipated impact of the Navy interceptor along Luoto Road and Highway 303 has been characterized as negligible. The impact of the remainder of the construction, that is other interceptors, treatment facilities and outfall line, would be unchanged. With the discharge to receiving waters decreased by 2 mgd, the impact on water quality obviously would be less; however, the decrease would not be significant since our modeling predicts an insignificant increase in ambient conditions due to the proposed discharge, including the Navy's 2 mgd, for all receiving waters except Sinclair and Dyes Inlets.

   Impacts associated with separate treatment of Navy wastes on the Bangor base are discussed in the Trident EIS (Vol. 1, p. 285 ff.). In our judgement the public would not accept the concept of discharge of waste to Hood Canal, which is considered to be a sensitive and valuable water resource. Assuming for the moment that this obstacle could be overcome, we have evaluated the feasibility of separate waste treatment for the Navy. The assumptions are as follows:

   1. Pretreatment would be the same for a separate Navy discharge or connection to a Central Kitsap facility.

2. Flow is equal to 2 mgd.

3. Use activated sludge process with nitrogen and phosphorus removal and additional solids and BOD removal per Department of Ecology policy on discharge to Hood Canal. This policy states that, in order to meet water quality standards for Hood Canal waters, removal levels required are 95 percent BOD, 95 percent suspended solids, 95 percent phosphorus, and 90 percent nitrogen (DOE Hood Canal Policy dated January 24, 1972).

4. Phosphorus removal by two-clarifier lime clarification, and nitrogen removal by ammonia stripping.

5. Basic reference for estimating is DOE publication entitled "Cost Estimating-Sewerage and Sewage Treatment Facilities," July 1971.

Utilizing these basic assumptions, costs of separate treatment for the Navy are estimated as follows:

	Capital Cost, $	O & M Cost, $/yr
Primary treatment	675,000	28,500
Secondary treatment	620,000	51,800
Lime clarification	240,000	43,800
Lime recalcination	210,000	34,300
Ammonia stripping	195,000	31,400
Disinfection	31,000	7,300
Outfall	66,000	
Subtotal	2,037,000	197,100
Cost escalation to June 1975 dollars, ENR index $\frac{253}{147.2} = 1.72$	3,501,100	354,800
Enginering, legal, admin.	1,400,400	
	4,901,500	
Activated carbon process	1,517,000	230,000
Total project cost (separate Navy project)	6,418,500	584,800
Navy participation in regional project (alternative 4a)	5,756,200	231,200

From this comparison, it can be seen that, in addition to a lesser total environmental impact, regional treatment is considerably more cost-effective.

Concerning the concept of treatment and discharge for recharge purposes, the demand is not apparent. A comprehensive study now being completed by the U.S. Geological Survey, with a report to be published in early spring 1976, shows that adequate groundwater resources exist well beyond the projected needs of the Trident project. This report will be entitled "Availability of Groundwater in the Trident Impact Area--Kitsap County, Washington" and will be published by A.J. Hansen, Jr. and Dee Molenaar, hydrologists with the U.S. Geological Survey. Current fresh water being used is 13 mgd; this is supplied by 9 mgd brought in from outside reservoirs and 4 mgd being pumped from groundwater. This is expected to eventually increase by 8 mgd due to Trident. Current recharge in the Trident impact area is 46 mgd. Approximately half of this reaches the deep permanent groundwaters, the remainder going off as interflow. The larger withdrawals required by growth associated with Trident will require careful evaluation of drawdown and transmissivity factors in order to avoid salt water encroachment problems. This is principally a problem of spatial location of withdrawals, which can be properly managed. With adequate groundwater available, then, for the foreseeable future, there is no economic incentive for recharge and it is not cost-effective. Additional water supply impact discussion can be found in the final Trident EIS (Vol. 1, p. 389 ff).

Disposal within the confines of the Bangor base is not feasible. An updating of the orignal soil surveys now nearing completion has shown that the Everett soil series, a permeable gravely sandy loam, is not nearly as prevalent as reported in the orginal 1939 survey. This was one of the few soil series that appear to have potential for receiving treated waste effluent. Navy Trident officials maintain that there is not sufficient land available for land disposal of Bangor wastes and, even if there were, Navy policy would not premit long-term commitment of large amounts of Base property for land disposal purposes. Based on the 1939 Soils Survey, there appeared to be sufficient Everett series soils (550 acres) on the northern portion of the Bangor Annex and adjacent private lands to accommodate the discharge of 3.8 mgd treated wastewater. Now that these soils have been reclassified as Alderwood series, 2,870 acres would be required. The entire Bangor Annex itself is only 6,960 acres in area.

The Navy has investigated the feasibility of expanding and upgrading the existing trickling filter facility now located on the Bangor base and has found this to be an infeasible alternative for reasons of cost, location and space. Continued discharge of an expanding volume of treated waste to Clear Creek would not only in all probability violate water quality standards but would also be contrary to the Department of Ecology's policy concerning minimum dilution requirements for discharge to perennial streams. (DOE Advanced Waste Treatment Policy dated May 12, 1972).

Finally, participation of Federal agencies in regional systems is a national policy supported by EPA. Executive Order 11572 specifies that Federal facilities shall incorporate common procedures in compliance with water quality standards and effluent limitations (Section 3 (d) (5). OPNAVINST 6240.30, the Navy's environmental protection manual, states: "The use of approved municipal or regional waste water collectional disposal systems shall be the preferred method of disposal of wastes from shore activities." (Paragraph 5102 a)

4. Please see the answer to comment No. 51.

5. All decisions regarding the use of sewer access to direct growth toward selected areas are under the jurisdiction of County officials. Such decisions have not been formalized, except by the recommendation of a plan which would not route the Trident Support Site interceptor sewer down Clear Creek Valley. The EIS simply points out the availability of this tool to County officials.

6. We do not agree that we are not fulfilling EPA's total responsibilities under the National Environmental Policy Act. We are not clear what unresolved conflicts you are referring to, but presumably you mean those associated with the impacts of construction of a waste treatment project. To our best knowledge, we are addressing these in our EIS process. Also, to the best of our ability, we are attempting to "study, develop, and describe appropriate alternatives to recommended courses of action, "as required by section 102 (2)(D). Your interpretation of section 101 is perhaps more specific than the writers of the Act may have intended. The Act states, "it is the continuing responsibility of the Federal government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may 1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations." We construe this to be a broad charge to the Nation as well as to EPA, which EPA is certainly attempting to fulfill. All or EPA's programs, air, water, etc., are aimed at fulfilling the public trust. If you could identify more specifically what you mean by "these other responsibilities," we would be pleased to evaluate our compliance.

7. It is not feasible to upgrade the existing sewage treatment facilities at the Trident Support Site so as to engender their ability to handle the Trident population influx. Please refer to comment

No. 3 for an expanded discussion. Furthermore, the population associated with Trident will not locate so as to permit the collection and treatment of its wastes on the Bangor base.

8. This statement is an opinion unsupported by the facts of the case.

9. The Trident Support Site development is subject to its own separate environmental impact study. Questions regarding the Trident Support Site, other than those concerning wastewater flow and quality, should be directed toward the Department of Defense.

10. No.

11. The studies already conducted for the proposed project have been substantially more exhaustive than typical environmental assessments for a wastewater treatment facility. No further studies are considered necessary.

12. This is a repetition of comments Nos. 3 and 7; please see those responses.

13. The proposed project is being planned in an environment which includes the Trident base. Growth attributable to Trident is assessed in the EIS for that project. Population growth attributable to the wastewater facilities is limited to potential direct employment (20 to 40 workers, depending on the alternative selected) and the limited secondary employment, plus dependents.

    Sewerage systems will tend to concentrate growth in their service areas if alternative disposal is limited. Approximately 90 percent of the service area has drainage limitations which inhibit, if not eliminate, the use of septic tanks (Reference 1). Growth is thus more likely in areas near sewer lines.

    No further studies are considered necessary to evaluate the environmental impacts associated with the proposed project at this time.

14. Applicable controlling documents would include Washington State building codes and permits from various agencies, including the Washington Departments of Fisheries and Game and the U.S. Army Corps of Engineers, all of which would demand compliance with specifications designed to protect the public and the environment. At the end of this response is an exerpt from the EPA construction Grants Program Handbook, which covers EPA's review of plans and specifications and related requirements placed on grantees.

15. The statement in the impact statement references water quality criteria for the State of Washington. These criteria include the statement that whenever the receiving waters of a classified area are of higher quality than the criteria, then the existing water quality constitutes water quality criteria.

16. Please note that the recommended plan, No.11, has the lowest annual cost based on pre-reimbursement dollars. EPA must select alternatives on the basis of project costs before reimbursement to the local agency. The equivalent annual costs were calculated in conformance with EPA guidelines for cost-effectiveness analysis.

17. The terms are subjective and relative. They are based upon calculation of percentage dilution and include a subjective evaluation of the physical modeling results demonstrated in the University of Washington film of their tests.

18. These questions have been answered in the analysis of alternative plan No. 11, presented to the public in the Supplement to the Draft Environmental Impact Statement and subsequently selected as the recommended alternative.

19. Washington State Water Quality Standards will govern the design of the outfall in that the facility must release treated effluent in a manner which will meet the standards. Site-specific studies at the outfall location were conducted during Phase II studies and the results reported in the draft supplement to the Facilities Plan.

20. This generally occurs where sewage transmission costs finally exceed treatment cost savings.

21. The dilution, dispersion and flushing ratings for each alternative were based upon a multi-port diffuser, e.g., the state-of-the-art technology. These ratings are a function of the physical configuration and hydraulics of the disposal area and cannot be changed. Water quality standards can be met or improved upon by increasing treatment, as was done for Dyes and Sinclair Inlets, or a new disposal site with improved characteristics can be chosen, at a different project cost. Therefore, the differences between alternative costs presented in the EIS are also the incremental costs of changing the rating of an outfall's site.

22. Please see the response to comment No. 3. The supplement to the draft EIS and the final EIS contain all of the specific information developed for EPA-funded portions of the proposed project. Collector lines and local mains are not EPA funded. As these later projects are developed, they will be subjected to additional environmental reviews under SEPA, or, if Federal funds are required, NEPA.

23. The ratings serve only as an aid to the governmental agencies so that they may make a wise choice in their decisions affecting the environment.

25. These studies have been reported in the draft supplement and final EIS.

26. The wording in the paragraph of the draft EIS to which you refer is a little misleading in that it leaves the reader with the impression that consideration was given to including all of sub-basins 12 and 13 within the Central Kitsap County planning area and that finally a decision was made to include only those portions lying within the Bangor base confines. This is not in fact what happened. The planning basin boundaries were set long ago by Washington State, at the beginning of the original studies for a Central Kitsap sewage facility, to include sub-basins 9 and 10. The Navy later requested service for wastes discharged from its Bangor Annex and the expanding loads associated with the Trident project. The planning area, then, should be considered as sub-basins 9 and 10, with receipt of a point-source industrial/domestic discharge from the Bangor Annex. From a practical standpoint, there is no particular justification for including those portions of sub-basins 12 and 13 outside of the Bangor Annex confines. These areas have little or no need for sewerage facilities at present and little or no growth projected into the future.

In answer to the second question, the environmental effects associated with exclusion of the portions of sub-basins 12 and 13 outside the Bangor base confines are considered insignificant, with no effect upon the alternatives considered under the Central Kitsap project.

27. Reference 3, the Trident Support Site Environmental Impact Statement, was used only as a source of factual or design information. All evaluations for the Central Kitsap project were conducted independently.

28. Additional information on the Point Monroe discharge site was presented in the draft supplement and final EISs. Also, please note the letters from the Washington State Department of Fisheries and from the Parks and Recreation Commission.

29. This question appears to relate to the provision of sewer facilities below the interceptor level. Land use plans and policies now in existence provide criteria for the definition of such areas. It should be remembered that the facilities plan is dependent upon land use policies and not the converse.

30. It is not admitted that the proposed project would have a major adverse secondary impact upon air quality. The project will help locate the population growth but will not cause it. No further air quality studies are needed.

31. Let us first make it clear that the noise impact is predicted to be the result of Trident-induced growth. Mitigating measures, such as a limitation on housing density, are within the jurisdiction of Kitsap County. Traffic-induced noise on major arterial routes cannot be mitigated by the proposed project.

32. Pacific oyster embryo bioassays of wastes in the Liberty Bay area were performed by EPA during the fall of 1975. The results of this analysis indicate that effluent from a primary plant (Poulsbo Sewage Treatment Plant) is about seven times more toxic than the effluent from a secondary plant (Keyport Sewage Treatment Plant) when diluted with seawater. Bioassays of the receiving waters themselves showed little toxicity at depth, but a significant amount at the surface. The causal relations for this have not yet been firmly established, and the synergistic qualities of secondary effluent and Liberty Bay water are not precisely known. Studies in California indicate that biological secondary treatment is 80 to 100 percent efficient in removing toxicity compared to 33 to 56 percent for primary treatment.

33. The proposed sewer project will induce an insignificant population growth; however, local groundwater supplies will be more than adequate to service this growth. For additional data on water supplies, please refer to the Facilities Plan and to Vol. 1 of the Final Trident EIS (p. 389 ff).

34. Results of the ecological modeling indicate that certain constituents, particularly phosphorus, accumulate significantly in Dyes Inlet, Sinclair Inlet and Liberty Bay when waste is discharged directly to these embayments. Even though the accumulation of phosphorus does not lead to an equivalent predicted increase in productivity, it may well be an indicator for the accumulation of toxicants such as heavy metals and chlorinated hydrocarbons.

The predicted impact upon the Port Orchard system is less for discharge to the Illahee and North Port Orchard locations. The discharge sites to the east of Bainbridge Island (Manchester) appear to have the least impact on the Port Orchard System.

It is entirely possible that the discharge of the Central Kitsap facility waste anywhere in Puget Sound will have an effect on the biological communities of Port Orchard. The magnitude of the direct impact will be greatest for discharge to the shallow, isolated bays such as Liberty Bay, Dyes Inlet and Sinclair Inlet;

less for discharge to the Illahee and North Port Orchard sites; and least of all for discharge outside the Port Orchard system.

For site-specific species information, refer to Chapter II of the draft supplement to the EIS and Appendix D.

The guidelines developed by the State of Washington's Department of Ecology call for mixing zone where length in the direction of the predominant tidal current is 150 feet plus the water depth in either direction from the outfall centerline. The width of the dilution zone is 100 feet plus the water depth over the diffuser plus the length of the diffuser or 15 percent of the width of the estuary, whichever is less. These guidelines are used at the discretion of the permit writer, who may change the dimensions on a case-by-case basis.

35. Possible aesthetic impacts from municipal discharges can come from floatable material, oil and grease, and bio-stimulation. A biological secondary treatment plant has a 75 to 85 percent efficiency (almost 100 percent for visible large matter) and 80 to 90 percent efficiency for the removal of oil and grease. Effects of bio-stimulation can be as high as an increase of 8 percent for the discharge from the Central Kitsap facility. It is debatable whether this is a meaningful increase.

36. With regard to water quality standards, please see the response to comment No. 15. The costs of the alternatives fully meeting these objectives is correctly and fully presented in the final EIS.

37. It has been eliminated during the first screening stages.

38. The results of modeling studies indicate that reconcentration of effluent is negligible with the exception of discharges to Liberty Bay and Sinclair Inlet.

39. Such simulations will be made in the future when the state-of-the-art improves sufficiently to assure accuracy of the results. Phase II studies already completed are sufficient to select an outfall site.

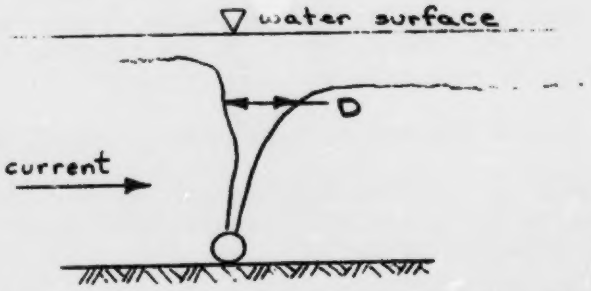
40. Verification of the hydraulic model studies was accomplished by means of drogue studies. Drogues were released at the specific locations, and their trajectories were observed by University of Washington staff. Drogue trajectories in the prototype agreed in general with dye releases in the hydraulic model.

41. Common engineering practice and experience together with theoretical equations were used to provide a simplistic yet reasonably realistic answer to questions of dilution. Typical diffuser

widths vary from 4.8 feet/1 mgd (Metro-Seattle at West Point) to 21 feet/ 1 mgd (County Sanitation Districts of Orange County). Current speeds were estimated from the hydraulic model of Puget Sound.

42. A secondary level treated effluent will assure against biological damage to local biota. Please see the response to the letter from the Washington State Parks and Recreation Commission. Although current speeds would be less than 0.1 knot for an average of 29 percent of the time, this means only that dilutions would not reach 100:1 or greater. However, 100:1 was selected as a conservative dilution, and numerical water quality standards could easily be reached at dilutions of only 30:1. Of the 29 percent of the time current speeds are less than 0.1 knot, they will mostly be sufficient to achieve at least 30:1 dilution. The balance of the time current speeds are higher promoting turbulent mixing of previously released effluent.

43. This is a very complex problem. The size of the mixing zone and its location will vary with effluent quantity, water depth, temperature, diffuser configuration, current strength and direction. The slope of the plume can be highly irregular, as shown in the accompanying sketch:



The distance, D, as estimated for the north Port Orchard channel at 100:1 dilution and a current speed of 0.1 knot, would be on the order of 10 feet, and the diffuser length would be approximately 270 feet. Please note that this is only a general estimate.

44. One cannot, practically, improve the mixing and dispersal characteristics of a specific site once an optimally designed diffuser has been selected. One can only relocate to a new site.

45. Phase II studies confirmed the currents in Port Orchard channel usine drogues instead of dye. Drogues are plastic floats which are pulled by the currents and give results comparable to dye studies. They are often used because they are easier to follow and do not disperse in the water.

46. The deletion of the site from the list was a typographical error.

47. Please see the response to the letter from the Washington State Parks and Recreation Commission. General literature states that with a properly treated effluent there is negligible, or no demonstrable, damage to benthic organisms. If the organisms throughout Puget Sound are similar, then inferences common to all may be drawn.

48. We have not identified migration patterns of the salmonids. The diluted effluent would not harm the salmonids or divert them from their spawning travels. The mixing zone plume itself would be so far offshore as to permit the salmon to swim around it on their various travels.

49. Please see the response to the letter from the Puget Sound Governmental Conference. Also, Chapter I of the final EIS contains a discussion of coordination with the City of Poulsbo. Please note also the comment letter from the City of Bremerton.

50. Specific discussion of sludge disposal is contained in the draft supplement and final EISs.

51. Acceptance of a 2-mgd Trident point-source load does not preclude an objective analysis of the possible impacts due to premature termination of the Trident project. Volumes 1 and 2 of the Final Trident EIS contain a discussion of premature termination, project stretch-out and development at a different boat level for the Trident project.

The draft of the County's contract for sewerage service with the Navy discusses termination under several cases. In each case, the Navy is required to reimburse the County for all costs and expenses incurred in the preparation and planning of the sewerage facilities occasioned by the provision of service to the Navy and resulting from such termination. In the event that the sewerage facilities have become operational, the Navy is required to pay all costs of maintenance and operation of facilities for capacity provided by the Navy, until such time as the County is able to secure other customers to utilize the facilities.

The Navy is paying the entire cost of constructing the interceptor from the Bangor Annex to its connection with the North-South interceptor leading to the treatment plant. The Navy is paying its proportionate share of cost of construction of the interceptor from that point to the treatment plant, of the treatment plant itself, and the outfall line discharging to receiving waters. There would be therefore no loss of capital cost to the County should the Navy terminate its participation. Since the treatment plant is being designed with parallel modular processing units, termination of the Navy's waste contribution would result in some of these units being taken out of service. Operation and maintenance costs would therefore be reduced proportionately. The only economic impact on the remaining users of the Central Kitsap County facility would be those costs associated with the economies of scale which would be lost due to termination of the Navy's participation. These should be relatively minor and are not anticipated to have a severe economic impact on the rest of the users of the system.

Concerning the level of user charges resulting from Navy contributions of less than 2 mgd, all users would pay their proportionate share of their waste loadings contributed to the system, in accordance with user charge guidelines, Appendix B to EPA's Construction Grant Regulations (40 CFR Part 35). Under these guidelines, the County will be required to review user charges at least annually and revise them as necessary to reflect actual treatment works operation and maintenance costs.

52. The data in Table II-22 will not be significantly affected by the provision of sewers in the area. Some additional traffic will be generated by the small work force operating the plant and their dependents (20 to 40 workers and families).

53. The county poor living in an area that will receive sewerage service will have to pay approximately $5.00 per month for the service. This may hurt their budgets, but they will benefit, along with the rest of the population, from reduced health hazards.

54. Housing for Trident Support Site construction workers was assumed to be off-base, as indicated by the U.S. Navy. In the long run, this housing would be occupied by Trident employees and as such is part of our basic assumptions.

55. The A.D. Little study is very exhaustive and definitive; no further studies are considered necessary.

56. The County has taken the position that the Trident-related growth will be accommodated as needed in Kitsap County. Non-Trident growth has been projected and distributed on the basis of current trends, and Trident-related growth has been distributed on the basis of time distance from Bangor. These distributions were made at the County Census Division level. At this point, the County has not adopted a policy which would significantly disturb that distribution. Some control on population distribution will undoubtedly result from the policies adopted in conjunction with the Complex Facilities Plan.

57. Yes, it does.

58. Please see the response to comment 29.

59. First of all, it is not a restriction, it is an estimate. Please see the response to comment 56.

60. We disagree. The environmental effects are associated with land use planning and should be approached whenever the County's land use plans are opened for public discussion and approval. See also the response to comment 22.

61. The sewered population of 18,000 is not a restriction. It is only a prediction that sewer lines will go where the population is densest.

62. This has been done in the draft supplement and final EISs.

63. With regard to Trident wastes, please see the response to comment 51. Flow rates for Central Kitsap County were based on measured values. Flow rates for Poulsbo were not measured by the URS Company but were accepted from Poulsbo's facilities planning consultant. One reason for the difference lies in the expected high number of multiple-family dwelling units in Central Kitsap County. The units produce less per capita flow.

64. Please refer to the chart following our response to comment 3 in your letter of March 26, 1976. We have absolutely no concern that the Navy is in any way attempting to avoid disclosure of any deleterious constituents in the waste they will be contributing. They have indicated that approximately 90 percent of their flows will be domestic in nature, with the remainder being commercial/industrial wastes from industrial type facilities. The largest portion of the industrial wastes will probably be heating plant boiler blowdown, along with some small amounts of wastes from plating and photo shops. As a discharger into a municipally owned and operated system, the Navy will be required to abide by the pretreatment standards which are designed to protect the operation of publicly owned treatment works and to prevent the discharge of pollutants which would pass through such works inadequately treated. Their present plans are to collect all industrial type waste separately and pre-treat in an industrial waste treatment facility on base. Those remaining wastes classified as "compatible" under pretreatment standards will then be discharged into the County system. Discharges in industrial categories are subject to effluent guidelines issued under Section 304B of the Federal Water Pollution Control Act Amendments of 1972 (Public Law 92-500). If they are discharging incompatible pollutants to publicly owned treatment works, they are required to adopt best practicable control technology currently available, as defined by the EPA Administrator, pursuant to Section 304B of the Act. The Navy will be specifically prohibited from introducing any wastes which would interfere with the operation or performance of the treatment works.

65. Please see the response to the letter from the Puget Sound Governmental Conference.

66. The Hansville Road solid waste disposal site has been subjected to the EIS process and found acceptable.

All reasonable and effective wastewater and sludge treatment systems were considered by the facilities planners, and in their judgment the proposed treatment system was best. The publication you cite is not a sludge treatment or process manual. The oxygen activated sludge treatment system is a form of wastewater treatment and is not applied to sewage sludge stabilization, generally due to its high cost. EPA's technical publication on sludge disposal is EPA 625/1-74-006, "Process Design Manual for Sludge Treatment and Disposal".

67. Yes; yes.

68. We do not agree with your statement that the EIS draft is totally inadequate for a reasonable examination of alternatives. Please see our response to your comment No. 3 for a discussion of alternatives available to the Navy for separate treatment for Trident wastes.

69. Collection line installation is strictly a local affair; there are none proposed for this project and they have no effect on the total annual cost of this project. The bond cost of 5-7/8 percent is not an unreasonable figure, depending on the type of bond, issuer, etc. Recent bond prices, as published in the Wall Street Journal, support the figure as a guideline. For example, the Wall Street Journal for November 21, 1975, p. 28, reports the sale of sewer bonds by the Heart of the Valley Sewerage District, Outagamie County, Wisconsin, at an average cost of 5.906 percent (ranging from 5.4 percent to 6.2 percent). For comparison, 5-7/8 percent is 5.875 percent. The average Wisconsin cost and the cost used in the EIS differ by .013 percent.

70. The EPA-published guidelines on fugitive dust are the following:

INVESTIGATION OF FUGITIVE DUST
VOLUME I - SOURCES, EMISSIONS, AND CONTROL
EPA - 450/3-74-036-a
June 1974

INVESTIGATION OF FUGITIVE DUST
VOLUME II - CONTROL STRATEGY AND REGULATORY APPROACH
EPA - 450/3-74-036-b
June 1974

DEVELOPMENT OF EMISSION FACTORS FOR FUGITIVE DUST SOURCES
EPA - 450/3-74-037
June 1974

EMISSIONS INVENTORY OF AGRICULTURAL TILLING, UNPAVED ROADS, AND AIRSTRIPS, AND CONSTRUCTION SITES
EPA - 450/3-74-085
November 1974

Volume I in particular contains a discussion of suggested construction techniques. Any construction specifications prepared by the County would be subject to a technical review for adequacy by an EPA project engineer prior to approval of grant award for construction. Consultants commonly require the utilization of specific dust and erosion control techniques in their construction specifications.

71. Please see the response to the letter from the Washington State Parks and Recreation Commission. It must be noted that treated effluent is fresh water with more buoyancy than salt water. Effluent leaving a diffuser will rise and be very well mixed before it works its way to the benthos. The very presence of thick pockets of clams off Manchester implies that the Manchester outfall produces negligible adverse effect upon them. The Manchester outfall also has no effect on salmonids migrating to Steel Creek.

Comparison of the toxicity data obtained from the Liberty Bay study with calculated dilutions indicates the effluent will have a negligible effect upon clams and salmonids in the Manchester area. For a secondary treatment plant, the Liberty Bay study indicated a required dilution of 1:70 to maintain a level of 0.1 times the EC_{50} concentration, as determined by an assay of Pacific oyster embryo. The EC_{50} concentration is that concentration resulting in a 50 percent abnormality in the embryo after a 48-hour test.

72. Treatment costs that reflect site-specific characteristics have been included in the analysis. As evidence of this, please note the tertiary level treatment recommended for Dyes and Sinclair Inlets. We have considered non-degradation and a negligible impact - meaning one too small to estimate or notice - to be equivalent. We do concede that nutrient enrichment could be a problem in enclosed bays, but that is one reason discharges to such areas were not recommended and that a discharge to North Port Orchard channel was recommended. The cost of a nitrified effluent is included in alternative costs. Dechlorination can readily be accomplished by aeration of the chlorinated effluent.

For consideration of waste reconcentration, please see the response to comment No. 38.

73. The analyses available to us were presented in the draft supplement EIS and are repeated in the final EIS. They are adequate to assess the relative impact of the alternatives.

74. The answer to the first two questions is yes. Concerning Navy flows of less than 2 mgd and their impact on costs to other system users, the only impact would be a possible slight increase in user charges due to the loss of economies of scale. See our response to comment No. 51.

75. Please see the response to comment No. 69.

76. Again, see our response to your comment No. 51.

77. Please see the response to comment No. 54.

The impact from the alternatives would be negligible or unchanged.

Handbook of Procedures

Construction Grants Program for Municipal Wastewater Treatment Works

February 1976

Municipal Construction Division
Water Program Operations
Office of Water and Hazardous Materials

U.S. Environmental Protection Agency
Washington, D.C. 20460

H. PREDESIGN CONFERENCE

Purpose and Discussion:

EPA, in conjunction with the State agency, should assume responsibility for insuring that the plans and specifications are prepared in accordance with sound engineering practice and regulatory requirements. Because of the complexity of these requirements, a predesign conference between the grantee, his consultant, the State and EPA is strongly urged, whenever practicable.

The predesign conference, which may be held with one or more grantees, promotes careful planning and coordination and insures the timely completion of the various phases of a project. In some cases, the review of plans and specifications may be delegated to a State. In such cases, the State is responsible for the predesign conference arrangements. For the other cases, the regions are encouraged to develop formats for the predesign conferences. The formats may then be tailored to the individual staffing resources of the States and the needs of the applicants.

Procedures:

Shortly after acceptance of a Step 2 grant, but prior to the preparation of plans and specifications, the reviewer should arrange a predesign conference with the grantee, grantee's consultant and State agency. Suggested subjects to be discussed include:

1. the legal requirement for inclusion of and provisions for carrying out the bidding procedures described in 40 CFR 35.936, .938, .939 and Appendix C-2;
2. the technical requirements of the design to insure that the project will meet effluent limitations per NPDES permit and will be designed in accordance with sound engineering practice;

   Re: 40 CFR 35.925-7

Preceding page blank

3. additional requirements, as applicable, for detailed design reports beyond that submitted with the facility plan. Possible examples are:

   - loading rates and sizes of various components of the plant;
   - design computations for sewers, including slopes and capacities;
   - system head curves for pumping stations, indicating number and capacity of pumps;
   - other detailed design reports which the particular project may require;

4. pretreatment design requirements and scheduling, as applicable, for industrial dischargers;

   Re: 40 CFR 35.925-15

5. design considerations or investigations resulting from the environmental assessment or environmental impact statement. Possible examples are:

   - a soil erosion plan;
   - a traffic control plan;
   - archaeological investigations;

   Re: 40 CFR 35.925-8

6. design requirements arising from executed agreements between jurisdictions;

   Re: 40 CFR 35.917-6

7. force account requirements, as applicable;

   Re: Program Guidance Memorandum, PG-34, 5/7/74

8. phasing of contracts;

   Re: Program Guidance Memorandum, PG-33, 5/10/74

9. flood protection insurance requirements, as applicable;

   Re: 40 CFR 30.405-10
   Program Guidance Memorandum, PG-54, 7/8/75

10. records to be maintained during design and construction, separating eligible and ineligible items;

    Re: 40 CFR 30.805, 35.940

11. site certification requirements, if not previously satisfied;

    Re: 40 CFR 35.920-3 (b)(4)

12. future requirements for

    - the user charge and industrial cost recovery systems;
    - a sewer use ordinance;
    - an evaluation/rehabilitation program, as applicable;
    - an operation and maintenance program, including O&M manual, staffing and training;

    Re: 40 CFR 35.935-12, -13, -16

13. requirements for submission of project status reports and requirements for periodic inspections and audits, as necessary, for large or complex projects;

    Re: 40 CFR 30.635, .820

14. requirements for construction contracts to conform with the standardized format, "Contract Documents for Construction of Federally Assisted Water and Sewer Projects";

    Re: Program Guidance Memorandum, PG-17A, 4/15/75

15. use of value engineering in the design phases of the project;

    Re: Program Guidance Memorandum, PG-45, 12/11/74

16. possible benefits from the use of construction management.

The reviewer should provide the grantee with guidelines, instructions, booklets, or other publications which describe specific requirements in detail.

I. REVIEW OF PLANS AND SPECIFICATIONS

Purpose:

To insure that the project to be built will satisfy effluent and statutory requirements.

Discussion:

Depending upon the complexity of the project, periodic reviews and inspections will have been carried out during the preparation of the plans and specifications and changes or modifications, if required, will have been made. The set of plans and specifications submitted for final review should reflect all changes and be suitable for bidding purposes.

The review procedures are both administrative and technical. The technical review procedures are broad in scope and each region is encouraged to pattern its own review procedures to account for State or local design practices and requirements. Although not specifically required, the use of a checklist such as the "Program Checklist for Engineering Drawings, Specifications, and Engineering Reports", Appendix C, is recommended.

Review Procedures:

a. Administrative Review

The following six items must be included in the bidding documents:

(1) a statement of work, including drawings and specifications, and the required completion schedule;

(2) the terms and conditions of the contract (40 CFR 35.938-8);

(3) an explanation of the method of bidding; the method of evaluating the bid prices, and the basis for the award of the contract;

(4) the criteria for evaluating bidders;

(5) the standard statement concerning the funding of the project by EPA;

(6) a copy of 40 CFR 35.936, 35.938 and 35.939.

In addition to the above six items, the reviewer is to insure that the specifications include the following provisions:

(1) Supplemental General Provisions

Appendix C-2 of 40 CFR Part 35 which includes requirements for:

- audit: access to records
- price reduction for defective cost or pricing data
- contract work hours and safety standards
- equal employment opportunity
- utilization of small and minority business
- covenant against contingent fees

- anti-kickback
- gratuities
- patents
- copyrights and rights in data
- clean air and water clause

(2) Equal Employment Opportunity

The EEO provisions must be followed where contracts are greater than $10,000. In areas having a home-town or an imposed plan, the contract specifications must contain the specific provisions of the plan as published by the Secretary of Labor in the Federal Register. Home-town plans are agreements reached among the local contractors, trade unions, minority groups and governmental agencies, which are approved by the Secretary of Labor, and contain the goals for the hiring and training of minority groups. Imposed plans likewise set forth minority hiring and training goals; however, such goals are not reached by agreement, but imposed by the Department of Labor.

In either instance, the reviewer should insure that the applicable plan is contained in the specifications.

In non-plan areas, contractors will be required to comply with the provision of Executive Order 11246 and engage in affirmative action directed at promoting and insuring EEO in the work force used under the contracts.

When the cost of the construction is estimated to exceed a ceiling amount specified by the Regional Administrator, the contracts may require special provisions. The reviewer, in such cases, should contact the Civil Rights and Urban Affairs Office within the EPA regional office for specific instructions.

Re: 40 CFR 35.935-6
40 CFR Part 8

(3) Davis-Bacon Act

The provisions of the Davis-Bacon Act must be included in contracts exceeding $2,000. These provisions require the payment of prevailing wages for the various trades as determined by the Secretary of Labor.

Prevailing area-wide rates are published weekly in the Federal Register. For individual projects not included in areas with area-wide wage rate determinations, the Regional Office will obtain a wage rate for inclusion in the specifications.

Modifications to area-wide wage rate determinations are to be included in the bidding documents provided they have been published 10 days prior to the bid opening date. Modifications to individual project determinations are to be included provided they are received in the Regional Office 10 days prior to bid opening.

The reviewer is to insure that the current wage rate determination is included in the bidding documents or that provisions for inclusion have been made.

Re: 40 CFR 30.403, .415

(4) Flood Insurance

For projects requiring flood insurance (see Chapter VI E.4.a. of this Handbook) make certain that the contractor is required to obtain the necessary flood insurance during construction.

(5) Bonding

For contracts in excess of $100,000, the following minimum bonding and insurance requirements must be met:

- 5% bid bond;
- 100% performance and payment bond;
- fire and extended coverage, workmen's compensation, public liability and property damage, and "all risk", as required by local or State law;
- flood insurance, as applicable, during construction.

For contracts less than $100,000, bonding and insurance requirements shall be in accordance with local or State practices.

b. Technical Review:

The technical review of the plans and specifications is carried out to insure that the proposed facilities, if constructed in accordance with the plans and specifications, will achieve the effluent limitations or water quality standards required by the NPDES permit. The review is also to insure that sound engineering design principles are employed, primarily regarding process considerations. Structural, electrical, and mechanical details of the design are not critically reviewed because they are the responsibility of the engineer whose seal appears on the drawings. However, obvious irregularities should be noted.

The technical review should evaluate the plans and specifications according to the criteria in "Program Checklist for Engineering Drawings, Specifications, and Engineering Reports" (see Appendix C) to the extent appropriate for the particular project and State requirements. The following are examples of items which should be reviewed.

(1) Safety Precautions

The requirements of the Occupation Safety and Health Act (OSHA) must be fulfilled;

(2) Mitigative Measures

Plans and specifications must be compared with mitigative measures required by the environmental assessment or impact statement. Examples might be soil erosion control, hours of operation, backfilling and seeding, structural design for buildings in a flood plain, etc.

(3) Bypassing

Construction is to be carried out so as to prevent bypassing of flows during construction, where possible.

(4) Project Sign

Contractor is required to provide a project sign in accordance with the drawing shown in Appendix B.

(5) Reliability and Flexibility

The proposed facilities must be reliable and provide for flexibility in operation. This may be accomplished, for example, by requiring standby power, by providing for bypass of individual plant units, by providing pumping capacity sufficient to operate the plant with the largest pump out of service, etc.

Re: No. EPA-430-99-74-001

(6) Operation and Maintenance

All equipment, piping, switches, instruments, etc. are to be clearly marked for ease of identification and location for operation and maintenance.

(7) Public Water Supply

All public water supplies are to be protected by adequate backflow preventors (for example, double check valves, air gap).

(8) Chemical Storage

All chemicals are to be properly stored and curbed to hold the entire volume in the event of an accidental spill. Also, adequate safety protection gear is to be provided, with proper storage, for plant personnel.

Re: Technical Bulletin No. D-71-1, 10/15/71

(9) Ventilation

Adequate ventilation is to be provided in all areas where necessary (for example wet well, dry well, chlorine room, chemical storage area, etc.).

(10) Laboratory Facilities

The laboratory facilities must be adequate to conduct the type of sampling and testing required by the NPDES permit or by the State agency.

(11) Emergency Alarms

Adequate alarms are to be provided to warn of failures or dangers.

(12) Use of Mercury

Mercury is not to be used for trickling filter seals. Other uses of mercury require special review and approval.

Re: Technical Bulletin No. D-71-2, 10/15/71

(13) Sewers

Acceptable levels of infiltration and test therefor are included; sewers should maintain minimum scouring velocities and have adequate capacity, including peaking factors.

(14) Equipment

Except where based upon performance specifications at least two trade names must be specified for all major items of equipment.

Re: Program Guidance Memorandum, PG-19A
40 CFR 35.936-13(a)

(15) Shellfish Waters

Where discharges will come into contact with shellfish waters, appropriate measures must be included to protect the shellfish.

Re: Technical Bulletin, Protection of Shellfish
Waters, EPA 430/9-74-010, July 1974

(16) Pretreatment

Where applicable the design must be in accordance with the requirements for pretreatment of incompatible industrial wastes.

Re: 40 CFR 35.925-15

c. Plan and Specification Approval

Upon approval by EPA of the plans and specifications, the grantee and State agency are to be so notified. The notification will generally be in the form of a letter and should contain any special conditions resulting from the review which would be imposed on the applicant upon application for a Step 3 grant. The approval notice should specifically remind the applicant not to advertise for bids until after applying for and receiving a Step 3 grant. He should also be reminded that the EPA is not obligated to award a Step 3 grant for the project.

Page 1 of ____
Date ________

PLAN AND SPECIFICATION APPROVAL

PROJECT NO:________ LOCATION:__________ OWNER:__________

Design Engineer____

Phone______________________

Approval by State Engineer_________________Date________________

Conditions for Approval (attach copy of certification letter and plan and specification approval letter)

____

____

____

____

Approval by EPA Engineer_________________Date________________

Conditions for Approval (attach copy of plan and specification approval letter)

____

____

____

Description of project in terms of type of treatment, flow capacity, and process units:

____

____

____

List of ineligible items (identify by bid item schedule, number and quantity).

____

____

____

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Page___ of____
Date__________

SUMMARY OF REVIEW

Summarize the apparent inadequacies revealed during the plan and specification review process and describe the resolution of each. If necessary, summarize pertinent conversations and cite specific correspondence with the consulting engineer:

Page ____ of ____
Date ____________

GENERAL INFORMATION

PROJECT NO: ____________________ PROJECT NAME: ____________________________

YES	NO	
___	___	Has an Environmental Impact Statement (EIS) been prepared on this project?
___	___	Have all recommendations of the EIS been followed?
___	___	Is the treatment process suitable for the character and volume of the sewage to be treated?
___	___	Have the components of the sewerage system been properly sized, based on realistic population projections?
___	___	Will a minimum of primary treatment be provided during construction?
___	___	Has an organized, systematic, readily understood Basis of Design been provided?
___	___	Has an I/I (infiltration/inflow) Analysis been completed?
___	___	If an I/I Analysis has not been completed, has the State certified that the contributing sewer lines do not have excessive infiltration/inflow?
___	___	Is shellfish growing a consideration? If yes, what protective provisions have been made? ______________________________ ______________________________
___	___	Will any of the contemplated construction be located in the flood plain and subject to flooding? If yes, what is the frequency? ______________________________ What reasonable protection has been provided? ______________ ______________________________
___	___	Is the project in a designated flood hazard area as defined under PL 93-234 (Flood Disaster Protection Act)? If yes, what amount of insurance has been obtained by the applicant under this Act? $________
___	___	Are permits to construct required from other Federal Agencies?
___	___	If yes, are these permits in the process of being secured?

Page ____ of ____
Date ____________

ENGINEERING DRAWINGS AND DETAIL SPECIFICATIONS

PROJECT NO: ____________________   PROJECT NAME: ____________________

YES	NO	GENERAL
___	__	Have at least two brand names been used with the or equal clause?
		BUILDINGS
___	__	Is an adequately equipped and stocked laboratory provided?
___	__	If not, have provisions been made to contract for labwork?
___	__	Is the space provided in the various buildings adequate?
___	__	Are heating, lighting, and sanitary facilities adequate in all buildings?
___	__	Are chemical storage and machine locations safe?
___	__	Have the restrictions on the use of mercury pursuant to TB D-71-2 been complied with?
		ENVIRONMENTAL CONSIDERATIONS
___	__	Have noise and odor control been given proper attention and provided for where necessary?
___	__	Has attention been devoted to a generally aesthetic appearance of the facility?
		RELIABILITY
___	__	Is standby power provided? If standby power is not provided, describe on an attachment the means of assuring continuous operation.
___	__	Have multiple units and equipment been provided to the maximum extent possible?
___	__	Can individual plant units be bypassed?
___	__	Are there adequate provisions for flexibility of operation?
		SAFETY FEATURES
___	__	Is the plant fenced or otherwise enclosed?
___	__	Is the public water supply protected by a backflow preventer?
___	__	Is mechanical ventilation provided where required?
___	__	Are railings and machine guards provided?

Page ____ of ____
Date ____________

PROJECT DESIGN DATA

PROJECT NO: ________________ PROJECT NAME: ________________

LOCATION: ________________ DISCHARGE TO: ________________

Scope of Project: ____

Degree of treatment (present): SS removal ___%; BOD_5 Removal ____%
Degree of treatment (proposed): SS removal ___%; BOD_5 Removal ____%

Is this project related or tandem to previous project(s): ____________
Description of new or modified plant: ______________________________
____

Type of Sewer System: Separate ____________ Combined ____________

PROJECT LOADING

	Present Load	Start-up Load	Design Year (19) Load
1. Industrial Wastes - mgd			
2. Industrial Wastes - BOD5 mgl			
3. Industrial Wastes BOD_5 lb/day			
4. Industrial Wastes - P.E.*			
5. Domestic Population Served			
6. Domestic Average Flow - mgd			
7. Total Average Flow - mgd (Items 1 + 6)			
8. Raw P.E. (Before Treatment (Items 4 + 5)			
9. Effluent P.E. (After Treatment) (Item 8) x (1-%BOD_5 Removal)			

Principal types of industrial wastes: ______________________________
____

Permit Number ________________________

Permit effluent limitations ______________________________________
____

$$\text{*P.E.} = \frac{\text{Total lbs. BOD5/day}}{0.17}$$

Page ____ of ____
Date __________

STREAM DATA

PROJECT NO: __________ PROJECT NAME: __________

1. Name of Receiving Stream __________
2. Estimated Minimum Daily Flow ______ Duration ______ Frequency ______
3. Stream - Free Flowing ( ) Sluggish ( ) __________
4. Distance Downstream to Nearest Community __________
5. Distance Downstream to Nearest Water Intake __________
6. Receiving Water Velocity __________
7. Salinity of Receiving Water __________
8. D.O., BOD and S.S. of Receiving Water __________
9. Temperature range of Receiving Water __________ °F
10. Temperature range of Effluent __________ °F
11. Area of Mixing Zone __________
12. Trapping Level (Will Plume Reach Surface) __________
13. Dilution Ratio __________
14. Calculated Coliform/100 ml __________
15. Stream Classification __________
16. Water Quality Criteria __________
17. Make computations to assure that the project effluent will not have a detremental effect on the quality of the receiving stream.

Page______ of ______
Date____________

SCREENING, GRIT REMOVAL AND FLOW MEASUREMENT

Bar Screen

Total Area ____________sq. ft. Effective Area ____________sq. ft.

Space Between Bars__________inches Velocity____________fps

Slope of Screen ____________ Is Drainage Platform Provided?__________

Mechanical Screen: Capacity__________mgd Type____________

Method of Cleaning: Manual ____________ Mechanical____________

Disposal of Screenings____________ Can screen be bypassed?____________

Comminuting Device

Type____________________________________

Location____________ Size____________inches Capacity__________mgd

Auxiliary Bar Screen____________________________________

Grit Chamber

No. Chambers____________ Type ____________________________

Cross-Section Area Each ________sq. ft. Total ________sq. ft. Length__________ft

Linear Velocity in fps: Average__________ Min. ________ Max.__________

Method of Velocity Control____________________________________.

Detention Period: Present Flow:__________Seconds Design Flow: __________Seconds

Drain Provided ____________________________________

Method of Cleaning: Manual________________Mechanical________________

Disposal of Grit:____________________________________

Flow Measurements

Type Metering Device____________Location (Raw Sewage or Eff.____________)

Indicating and Recording Mechanism____________________________

Approval by State Engineer:____________________________

Comments:____________________________________

____

Page ________ of ________
Date____________________

SEDIMENTATION TANKS

Type: Primary: __________ Intermediate:______________Final:____________

Feed: End/center/peripheral________________

Number Tanks________________________ Shape of Tanks______________________

Inside Dimensions: Length______Width_______SWD_________Depth______Diameter_______

Effective Volume Each Tank____________cu. ft. Total Volume______________cu. ft.

Recirculation Rate _________Design Flow (including recirculation__________mgd

Detention (Average 24-hr. flow): Present___________hrs. Design___________hrs.

Surface Loading: Present______________gpd/sq. ft. Design_________________

Length of Overflow Weir____________ft.; Overflow Rate_______________gpd/ft.

Is overflow Weir Adjustable?____________Type of Weir___________________

Sludge Collection Equipment, Type______________________________________

Scum Removal (Type):____

Disposition of Scum____

Sludge Removal by: Pump_____________Gravity_______________to______________

Approved by State Engineer:____

Comments:____

____

Page ______ of ______
Date ______________

AERATION TANKS

Number Tanks ______________________ Shape of Tanks ______________

Inside Dimensions: Length ______ Width ______ Depth ______ Diameter ______

Net Volume Each Tank ____________ cu. ft. Total Volume ____________ cu. ft.

Percentage of Daily Flow of Return Sludge to Aeration Tank ______________

Design Flow (exclusive of return sludge) ______________________ mgd

BOD_5 Loading __________ ppm __________ #/day

Required Air ____________ cu. ft./#BOD_5/day

Furnished Air ____________ cu. ft./#BOD_5/day (normally 150% of required air)

Detention Time (Average 24-hr. Flow): Design ________________ hrs.

Length of Overall Weir ____________ ft. Overflow Rate ____________ gpd/ft.

Equipment

Number Blowers ________ Cap. Each ________ cfm Total Cap ________ cfm At ______ lbs.

Diffusers: Plates ____________ Fixed Tubes __________ Swing Diffuser __________

Impingement Aerator __________________ Jet Aerator ________________

Mechanical Aeration

Number Units ________________ Updraft Tube ____________ Down Draft Tube __________

Operated Intermittently by Time Clock ________________________

Sludge Return Pumps

No. Pumps ________ Type ________ Cap. Each ______ gpm Total Cap. __________ gpm

Rated Heads ________ ft. Computed Heads ________________ ft.

Approval by State Engineer: ______________________________

Comments: ______________________________________

____

Page ________ of ________
Date ______________

TRICKLING FILTERS

Type (Standard or High Rate): ______________________

Number of Filters ________ Dimensions: Dia. ________ ft. Depth ________ ft.

Surface Area: Each __________ sq. ft. Total ______ sq. ft. ________ acres

Depth of Media __________ ft. Volume of Media ______________ cu. yds.

Average daily flow ____________________ mgd.

Recirculation

A. Quantity ______________ mgd. returned from ________ to ________

B. Quantity ______________ mgd. returned from ________ to ________

Total __________ mgd

Hydraulic Loadings: ______________________________ mgd/acre

BOD$_5$ Applied Sewage ______________ ppm ____________ #/day

BOD$_5$ Loading ______________ #/cy/day ________ #/acre-ft./day

Filter Material: Size ________ inches; Kind ______________

Soundness test specified: ____________

Distributor: Type __________ No. Arms ____________

Provisions for Flooding ____________ Air Channels Adequate __________

Recirculating Pumps

Pump No.	Type	Capacity	Rated Head	Computed Head
______	__________	__________ gpm	________ ft.	________ ft.
______	__________	__________ gpm	________ ft.	________ ft.
______	__________	__________ gpm	________ ft.	________ ft.
______	__________	__________ gpm	________ ft.	________ ft.

Approved by State Engineer: ______________________________

Comments: ______________________________

____

Date ____________

WASTE STABILIZATION PONDS

Location ____

Number of Ponds _____ Operation: Series _____ Parallel _______ Either _______

Surface Area: #1 _____ #2 _____ #3 _____ Total: _________ acres

Loading: __________ Persons/Acre _________ #BOD_5/Acre/day

Grit Removal Required ____________ Screens Required _________

Provisions to Divert Surface Water ____________________________

Provisions for Measuring Flow: ____________________________

Provisions for Sampling: ____________________________

Depth: Optimum Operating _________ ft. Maximum ________ ft. Minimum ________ ft.

Freeboard: ___________ ft.

Type of soil: ____________________________________

Are specifications adequate for compaction of embankments? ____________

Top width of embankment _______ ft. Erosion Protection ____________

Embankment Slopes: Inner ________ Horz. _____1_____ Vert.

Outer ________ Horz. _____1_____ Vert.

Depth of Submergence of Inlet ____________ ft. Distance from Bank __________

Distance From Inlet to Outlet ______________ ft.

Is scour protection provided at inlet? ________________________

Drawoff levels: Top __________ Middle __________ Bottom __________

Bottom Drain ______________

Is controlled overflow provided? __________________

Provision for effluent disinfection __________________

Appropriate Warning Signs ______________ Fence provided ______________

What provisions have been made to fill the ponds ____________________

Approval by State Engineer: ________________________________

Comments: ____

____

Page______ of ________
Date__________________

SLUDGE DIGESTION - SEPARATE

Single Stage or Primary Digestion Tanks

No. Tanks_________Dimensions Each: Diameter_______ft. Depth________ft.

Volume Each_____cu. ft. Total Vol. 1st. Stage____________cu. ft.

Volume Per Capita (Design) _______________________cu. ft.

Second Stage Digestion Tanks

No. Tanks_________Dimensions Each: Diameter______ft. Depth_______ft.

Volume Each________cu. ft. Total Vol. 2nd. Stage______________cu. ft.

Volume Per Capita____

First and Second Stage Digesters

Total Volume All Tanks ___________cu. ft. Vol. Per Capita________cu. ft.

Heated_________________________Unheated___________________

Gas Disposal____________________Aux Heat______________Heat Exchanger__________

Type of Cover___________Pressure and Vacuum Relief on Cover_____________

Is unvalved overflow provided?_______________________

Flame Trap_________Drip Traps___________Waste Burner___________

Sludge Withdrawal Line (Size)__________inches. Pumped ______Gravity________

Circulation = Gas/Mechanical______________Supernatant Disposal___________

Recirculation Pumps or Sludge Pumps

Number_______Cap. Each_________gpm. Size Disch. Line____________inches

Rated Heads__________ft. Computed Heads_______________ft.

Approval by State Engineer: ____

Comments: ____

____

Page______ of________
Date________________

SLUDGE DISPOSAL

Sludge Drying Beds

Number of Beds____________________ Area of Each Bed_______________

Total Area________________________

Area per capita: Present_________________sq. ft.

Design_________________sq. ft.

Gravel: Layer Depths____________________Sizes______________

Sand: Depth__________________________inches

Underdrains: Size______________________Spaced C-C_____________

Freeboard Above Sand________________________Suitable Splash Pad_________

Beds Subject to Flooding_________Concrete Runners Provided_____________

Is drainage from beds returned to plant for treatment?______________

Vacuum Filters

Type of Sludge to be Handled: Raw___________Digested___________

Number of Filters____________Size_____________Capacity___________

Total Area_________________Chemical Treatment_______________

Filtrate Disposal________________

Holding Tank__________________

Lagoons

Will groundwater be protected from contamination?___________________

Number of Lagoons__________Total Volume of Lagoons___________

How will sludge be disposed of?_____________________

Approval by State Engineer: ________________________________

Comments: ____

____

Page _____ of _______
Date ________________

CHLORINATION

Points of Application ____

No. of Chlorinators ____________________ Type ________________

Total Capacity lbs/24hrs. _______________

Total Capacity lbs/mg flow: Present _______________ Design ____________

Chlorinator Room

Outside Door Only __________________________

Type of Ventilation ______________________________

Scales Provided __________________________________

Adequate Storage for Containers _____________________

Gas Masks Provided ______________________________

Chlorine Contact Tank

No. of Tanks ______________________________

Inside Dimensions __________________________

Capacity ___________________________________

Detention Time __________________________ min. @ present

__________________________ min. @ design

Can Tanks be drained? ________________ Sludge Removal _____________

Disposal of Drainage: _______________________

Approval by State Engineer: _________________________________

Comments: ____

____

Page ________ of ________
Date ____________________

SEWAGE PUMPING STATION

Location ____

Type Pumps Specified ________________________________

Type Pump Control ______________ Alternator __________ Simultanious ________

Are Duplicate Units Provided? ________________________

Can max. flow be handled with largest unit out of service? __________

If not, explain alternate procedure ______________________

Maximum Flow __________ Average Flow __________ Minimum Flow __________

Volume of the wet well ______________________________

Detention time @ maximum flow ______________ minimum flow ______________

Does the fillet in the wet well have adequate slope? ______________

Has a bar rack or sand trap been provided? __________________

Is there a gate valve and a check valve on discharge? ______________

Is there a gate valve on suction? ________________

Is ventilation provided in the wet well? ______________ Dry well ______________

Is standby power, automatic overflow or a detention pond provided? __________

Is an adequate alarm system included? ________________

PUMP No.	SIZE (in.)	FRICTION Head (ft)	STATIC Head (ft)	CAPACITY gpm	RATED TDH	COMPUTED TDH	CONSTANT/ VARIABLE SPEED

Approval by State Engineer: ________________________________

Comments: ____

____

Page ______ of ______
Date ________________

SEWERS

Location ____

Type of Sewer: Sanitary ________ Combined ________ Storm ________

Classification: Collector ________ Interceptor ________ Outfall ________

Type of Pipe ________________ Type of Joint ________________

Length of Sewer ________________ Diameter ________ Slope ________

Design Velocity ____________ Required Velocity ____________

Minimum Velocity from Sta. ____________ to Sta. ____________

Design Capacity ____________ Required Capacity ____________

Is the cover adequate in all cases? ________________

If the cover is not adequate, where? Sta. ________ to Sta. ____________

What type joint test is required? ________________________

What are infiltration/exfiltration limits? ________________________

MANHOLES

Maximum distance between manholes ________________________

Diameter of Barrel ________________ Diameter of Cover ______________

Are manholes provided at all changes in grade, size or allignment of sewers? _____

Is outside plaster required? ______ Paved invert? ______________

Are corrosion resistant steps or ladders provided? ______________

Are retainers and blocking provided where necessary? ______________

Approval by State Engineer: ________________________________

Comments: ____

____

Page______ of ______
Date________________

OUTFALL

Design Flow____________________mgd

Outfall Length__________ft. Diameter______________inches

Diffuser Length__________ft. Diameter______________inches

Number of Ports____________________

Depth of Discharge________________ft.

Approval by State Engineer: ____________________________

Comments: ____

____

Page ____ of _____
Date____________

FORCE MAIN

Location____

Hazen-Williams "C" factor used for Design________________________

Type of Pipe__________Size_________Pressure Class______________

Type Joint Specified_________________________________

Force Main Length____________Computed TDH______________Rated TDH___________

Velocity________________Minimum Cover Provided_________________

Are Blow-Offs Specified?____________Air Relief Valves?_____________

Are Thrust Blocks and Retainers Provided Where Necessary?______________

Approval by State Engineer: ______________________________________

Comments: ____

____

LAW OFFICES OF
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IN REPLY REFER TO
OUR FILE NO.

March 26, 1976

RECEIVED
MAR 29 1976
EPA-EIS

Mr. Richard Thiel
c/o EPA, Region X
1200 Sixth Avenue
Park Place
M-S 537
Seattle, Washington 98101

Dear Mr. Thiel:

On behalf of C. A. Ross, we are submitting the following comments upon your draft EIS Supplement, EPA 910/9-75-012, regarding the Central Kitsap County Wastr Water Facilities. We understand that our comments of October 20, 1975 on the draft EIS are to be included in your responses to the draft EIS Supplement; so they are not repeated here.

ADEQUACY OF ENVIRONMENTAL ANALYSIS

The recently adopted State of Washington SEPA Guidelines provide for use of your EIS in lieu of one separately prepared under SEPA if certain conditions are satisfied. See WAC 197-10-650, 652. Under these Guidelines and prevailing NEPA case law, we must reluctantly disagree with the assertion on Page I-2 of the Draft EIS Supplement that a "complete" (inferring adequate) description and environmental analysis of the new alternative and indeed of others has been made. With respect only to the SEPA Guidelines, the environmental elements of WAC 197-10-444, when applied locally, have not been adequately treated in the draft EIS. Supplementation, modification or new EIS preparation will be required. See WAC 197-10-652.

Without being inclusive and thus arrogating to ourselves the County's duty to prepare adequate environmental documents, we offer a few examples of the inadequacy. The total proposal includes the collectors which are functionally related to the treatment facility. See WAC 197-10-060. Yet the 1

1 impacts and alternatives for that portion of the total proposal are not discussed. Alternatives and mitigating measures are absent for the treatment plant location, size and configuration and for the outfall pipeline routing from the treatment plant.

2 Continuous requests have been made for environmental analysis of the alternatives regarding the Trident waste load to the treatment facility. (See our letters of 10/11/74, 6/3/75, 9/3/75 and 10/20/75 to EPA, and of 7/23/75 and 1/15/76 to the County). What are the environmental factors and impacts associated with the alternatives of 1) not treating any Trident wastes, 2) accepting only Trident waste volumes that cannot be further reused or recycled, and 3) deep well disposal or high rate land disposal of Trident wastes. Without examining these alternatives a course of action contrary to the preliminary Kitsap County Comprehensive Growth Plan goals and objectives of encouraging recycyling of waste water and solid waste will result. An initial question is what discernible reduction of impacts (like cold shock or fresh water impact for marine water quality or biota) are associated with a reduction in discharge volumes?

3 EPA's failure to examine a reduced Trident waste load resulting from reuse enable the Navy and EPA to not act as trustees of the environment for future generations. For whether ground water is available or not, unnecessary short term use of water resources is contrary to this trustee duty. The County's Facility Plan consultant told the Citizens Advisory Committee on April 2, 1975 that the Plan must look at "3) reuse of waste water." It does not; and your action to enable the construction of a treatment plant at a capacity which takes no account of volume reductions by reuse is contrary to NEPA and applicable grant regulations. See 40 CFR 35.905-3. We ask that you include in your final EIS information from the USGS re ground water availability and from the Navy re reduced waste load volumes resulting from reuse. This coordination procedure is mandated by the policy requirements of NEPA.

4 How can the alternative of high rate land disposal be analyzed without soil type information for the Bangor site? See B-2 of the Draft EIS Supplement.

These reuse alternatives all relate directly and immediately to the need for the proposed facilities capacity.

RELATIVE ENVIRONMENTAL EVALUATION

Page I-6 of the draft EIS Supplement notes that the relative environmental weightings should be viewed with caution. Why is this so? What limits should be recognized as limiting the reliance upon these numbers? What confidence level and uncertainty is to be associated with the relative weightings? The Paramatrix report "Mathematical Model of Three Port Orchard System Outfall Sites" states at page 6 "Although values have occasionally been recorded, Port Orchard and Dyes Inlet lack sufficient profile data for the remaining seasons." How does this deficiency affect the relative weighting for marine water quality and aquatic biota impact at the North Port Orchard disposal location? 5

We request a complete review and verification of the weightings set out in Figure II-1. We suggest particular attention to the Socio-Cultural Impacts for Alternative 11. We must question the relative ranking of Alternatives 9 and 11, particularly since the Facilities Plan notes that the North Port Orchard disposal site is almost one-third worse than the Manchester site. Should the environmental facts not be given adequate weight or recognition in the decision making process and the North Port Orchard site be chosen, what further studies, mitigating measures and costs are necessary to preclude violation of the non-degradation water quality requirements and all adverse impacts greater than the environmentally preferable alternative? 6

TREATMENT PLANT IMPACTS

A high ground water table problem is identified at page II-3 of the draft EIS Supplement for the proposed treatment plant site. What alternative treatment plant locations and configurations are available to eliminate adverse operational consequences, on the ground water quality such though caused by accidental spills or material storage? Because of this ground water problem, we ask that you review the "+50" rating given in Figure II-1 to the ground water quality parameter for Alternative 11. 7

Page IV-7 makes certain comments regarding adverse impacts and mitigative measures for the pipeline routing used with Alternative 11. What mitigating measures and associated 8 costs will be employed to eliminate these impacts? Do the cost figures reflect this? What mitigating measures, associated costs or pipeline routing alternatives are there to protect the ravine, preclude soil erosion and water turbidity violations, and minimize pipeline integrity problems. (See page II-7 re the ravine and pages II-8 re turbidity problems). 8

A reasonable alternative would be to have the Navy construct and own the pipeline from Bangor down Clear Creek connecting at Bucklin Hill Road. This would preclude the possibility of non-Navy hookups in the Clear Creek area and eliminate growth inducement. The Navy would then pay a portion of capital costs for the pipeline across Bucklin Hill Road and reduce the capital costs to Central Kitsap County citizens and the bond principal. Can not the Navy pipeline construction be effected in a manner so as to preclude adverse environmental consequences? Political opposition is not a determinative factor in ruling out an environmentally preferable alternative. 9

WATER QUALITY IMPACTS

At page II-10, the draft EIS Supplement asserts that it is the transport of clean dilution water across the diffuser which controls the degree of initial dilution obtainable. Assuming a reasonable amount of receiving water, it is the jet momentum of the diffusers not the volume of dilution water which controls the near field dilution phenomenon and hence initial dilution. Similarly, on page II-13 certain assumptions are stated regarding the calculation of dilution. As to the assumption that jet momentum will cause mixing in the bottom one-half of the total mixing depth, to what extent have the studies for diffuser site location accounted for inadequate momentum resulting in discharges colder than the receiving water laying on the bottom? 10

At page II-11, the draft EIS Supplement states that the Port Orchard UW model is accurate, although subject to some limitations for some outfall locations. What are the limitations for the North Port Orchard outfall and what uncertainty do they cause in the conclusion that ambient water quality will not be degraded? (See page 12, "Application of an Ecological Model to Port Orchard, Sinclair Inlet, Dyes Inlet 11 and Liberty Bay Subsystem of Port Orchard" by John R. Yearsley.) If there are uncertainties, what mitigating measures and engineering safeguards and associated costs will be employed to insure that the ambient water quality will be maintained and enhanced. What added studies will be required to confirm the acceptability of North Port Orchard should it be selected? (See particularly pages 12 and 13 of Yearsley's report cited above). 11

Table II-3 confirms the inadequacy of the North Port Orchard site. On the average 29% of the time the assumed desirable dilution factor of 100:1 will not be met. For neap tides, it won't be met 40% of the time. Should Port Orchard be selected, what conditions in an NPDES permit pursuant to Section 302 of the Federal Water Pollution Control Act Amendments of 1972 9PL 92-500) would be appropriate? 12

How is the data in Table II-13 for North Port Orchard related to the determination by Parametrix that under the worst case the predicted dilution at the periphery of the defined dilution zone would only be 29.5 (see page 23, Parametrix report) or about one-third of the desirable initial dilution which is well inside the dilution zone boundaries? This also casts strong doubt about the rating of "+50" for marine water quality impacts identified at page IV-27. There the initial dilutions, serving as a basis for the +50 rating, were said to be in the range of 50:1 to 200:1. When the dilution won't reach 100:1 about 40% of the time for neap tide conditions, the rating of +50 appears unrealistic and arbitrary. Analysis of all this dilution information also suggests strong doubt about the value of the statement on page II-15 that a dilution of 5000:1 is probable -- particularly when it then says this is only considered accurate to an order of magnitude. 13

We also question the unconditional statement regarding the UW study. As evidenced by comments in that study, even the UW does not conclude as to North Port Orchard that significant doubts do not exist. They note at page 28 (Final Report, An Oceanographic Study of the Port Orchard System) that dye transport into undesirable areas was evidenced. This includes the Brownsville area. (See also page 73, Final Report; page 3 of Interim Report #1, and pages 10 and 11 of Interim Report #3). What is the possibility of localized water 14

14 quality violations due to such transport from the North Port Orchard site; and how will they be mitigated? At page 42, the slow flow past the North Port Orchard site is discussed. At page 40, the report notes that tidal waters can receive two slugs of discharge a day. To what extent will waste buildup or reconcentration occur from the North Port Orchard disposal? Will this occasion localized water quality degradation; and if so, how will it be eliminated?

15 The conclusion on page II-17 that the studies do not support the conclusion that Point Monroe is a superior site to North Port Orchard is error. The UW study at page 146 specifically concluded "Model observations showed that discharge of waste into the main basin of Puget Sound is more desirable than discharge into the Port Orchard System." The Parametrix study, even though it examined a Point Monroe discharge closer to shore than is desirable (see top of page II-15, draft EIS Supplement), uniformly demonstrates the superiority of the Point Monroe site over the North Port Orchard site. Even Figure II-1 of the draft EIS Supplement affirms the superiority as to physical impacts of the Point Monroe site. This rationalization to support North Port Orchard should be corrected to reflect study results.

DEMOGRAPHICS

16 How much of the estimated population (see page II-25) will be located on the Trident base and in the service area to be served? How will the Navy's determination regarding on-base housing policy affect the waste load?

PLANT CAPACITY

17 Page III-1 indicates a revised design flow of 3.8 mgd. Is 2.0 mgd of that flow still due to Trident? How would Trident water reuse affect the design capacity? What are the cost and environmental impacts of such reduced capacity? What are the costs for the reserve capacity of the treatment plant facility; and how does the capacity of the plant compare with the capacity of the sewer system? (See December 5, 1975 report by the General Accounting Office to the Natural Resources Subcommittee of the House Government Operations Committee re EPA Region III and V approved grant applications).

SLUDGE DISPOSAL

Sludge generated by the treatment facility will in part originate at the Trident federal facility. Regardless of its processing off the base, this fact subjects the treatment facilities sludge disposal to EPA's guidelines for the land disposal of solid wastes. See 40 CFR § 241, particularly § 241.100(d). Will the sludge disposal be in accordance with these guidelines? What are the costs associated with these requirements? Have the environmental factors regarding sludge disposal in EPA's report "Disposal of Sewage Sludge into a Sanitary Landfill" (Final Report (SW-71d) for Grant No. 5801582, 1974) been reviewed and considered here? 18

COSTS

The total O&M costs are less expensive for Alternative 9 than for Alternative 11 (See page III-11). These total costs are those costs dependent upon the annual quantity of waste water collected and treated. Fixed annual costs are set out in Table III-4 under the column titled "Annual Amortization." It is the combination of these total annual costs which represent the annual total cost of the facility. See Appendix A, paragraph f(3), 40 CFR § 35. And this total annual cost is cheaper for Alternative 9 than for Alternative 11. 19

Annual Cost	Alternative 9	Alternative 11
Total O&M	$412,800	$457,600
Annual Amortization	114,300	80,900
Total	$527,100	$538,500

Port Orchard is simply more expensive.

The costs for Alternatives 9 and 11 should be lower since it appears that an artificially high interest rate figure of 7.5% was used. Current tax free municipal bonds are going at lower rates. The interest rate set out in the Water Resources Council's "Proposed Principles and Standards for Planning Water and Related Land Resources" should be used and the cost figures corrected. 20

What is the basis for the Navy paying 40% of the capital cost? What would the percentage be if the Navy were to hook on to the pipeline at Bucklin Hill Road south of Clear Creek? How was the Navy's 48.08% shares of O&M costs calculated? Does the percentage depend upon the Navy's percentage of total design flow, does it depend upon actual delivered flows, and does it depend upon the strength of wastes delivered? 21

At pages V-13 and VI-1, comfort is apparently given to citizens about any uncertainties in the North Port Orchard alternative since the plant could always be upgraded or the outfall could be extended to Point Monroe. This is rather like buying insurance after the plane crash. What criteria and procedures will be used to give advance warning that this might be necessary? What added costs might reasonably be associated with such future significant changes? 22

Even assuming no uncertainty, no adverse impact, no conservation of water, and that the draft EIS Supplement costs are correct, Table III-4 indicates that each citizen of Central Kitsap County served by the facility would only have to pay 4.6 cents per month more for Alternative 9 than for Alternative 11. A decision for Alternative 9 when such small costs (well within the uncertainty of the cost estimates and to be less if a realistic interest rate were used) are involved would constitute an arbitrary and capricious disregard of the environment. This is because an added cost of 4.6 cents per month is a reasonable method to mitigate and eliminate the adverse environmental consequences of Alternative 11 which are significantly greater than Alternative 9. The Facilities Plan indicates that North Port Orchard is about 30% worse environmentally than Manchester. 23

Yet the 4.6 cents per month differential may be reversed if the costs of all reasonably required mitigative measures (see pages IV-12, 26, 27, 31, for example) and added studies (see page IV-15, for example) and other costs identified in Appendix A, 40 CFR §35 are fully accounted for. 24

Sincerely yours,

HOUGHTON CLUCK COUGHLIN & RILEY

Joel Haggard

JH:mn
cc: Mr. C. A. Ross
Honorable Frank Randall
Honorable John Merkel

Response to letter of 26 March 1976 from Mr. Joel Haggard

1. Collectors are not normally funded by EPA grants and are not included as part of the proposed project. As collection systems are proposed later they will be subject to separate environmental reviews. The health benefits of providing these collectors have been demonstrated years ago. The proposed project would take wastewater from these collectors to a central treatment facility and discharge treated effluent.

   No adverse impacts were found in association with the site proposed for the recommended plan. Configuration of buildings within the site is not considered relevant to environmental impact in this case. No significant adverse impacts were found in association with the outfall pipeline routing.

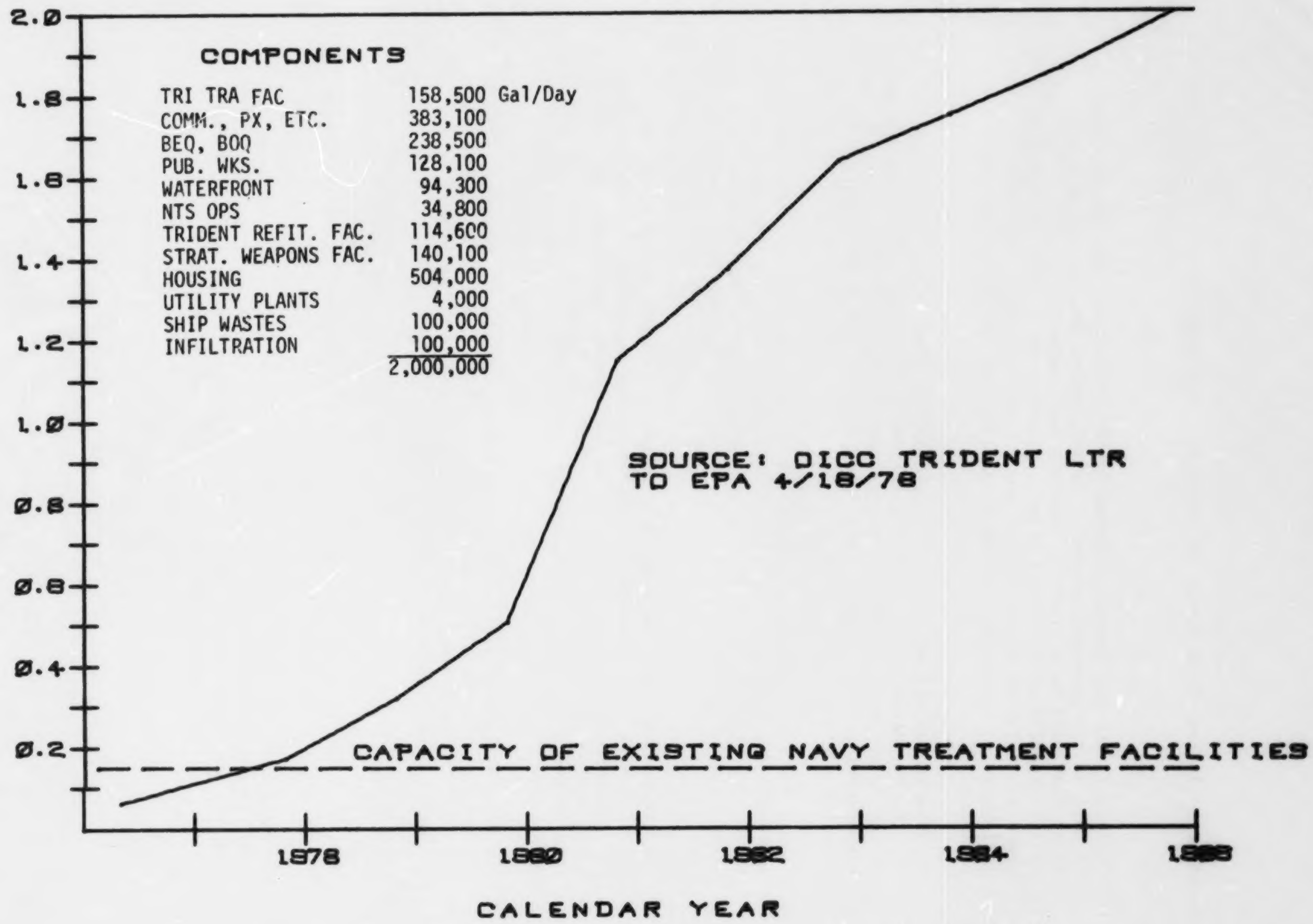
2. Please see the response to comment No. 3 of your earlier letter, which addresses the separate treatment of Trident wastes. As for deep well injection, groundwater is of higher quality than marine waters by any standard and is used as the major source of water supply in the study area.

3. Our discussions with the U.S. Navy resulted in their assessment that 90 percent of their wastewater would be domestic sewage. This implies that 90 percent of their water use is for domestic purposes. At this time, wastewater reuse for domestic purposes is not acceptable within this country. No potential industrial users of reclaimed wastewater were found in the study area.

   The availability of sufficient groundwater supplies in the study area has been referenced in the Facilities Plan as a personal communication with Mr. Arnold Hansen, a hydrolcgist with the U.S. Geological Survey in Tacoma, Washington on 28 October 1975.

   The attached chart presents the Navy's estimate of wastewater source distribution on the Trident Support Site. The reuse of wastewater from each facility was considered in the preparation of these estimates, but no major reuse opportunities are forseen at this time.

4. Appendix I of the draft supplement EIS states that three soil types found in the study area are suitable for land disposal of effluent; they are Indianola loamy sand, Kitsap silt loam and undifferentiated alluvial soils. Based upon Figure 5-3 of the Facilities Plan's technical report, the relative quantity of the desired soils in the confines of the Trident Support Site is very low and inadequate for land disposal. See also the response to comment No. 3 of your earlier letter.



COMPONENTS

TRI TRA FAC	158,500 Gal/Day
COMM., PX, ETC.	383,100
BEQ, BOQ	238,500
PUB. WKS.	128,100
WATERFRONT	94,300
NTS OPS	34,800
TRIDENT REFIT. FAC.	114,600
STRAT. WEAPONS FAC.	140,100
HOUSING	504,000
UTILITY PLANTS	4,000
SHIP WASTES	100,000
INFILTRATION	100,000
	2,000,000

SOURCE: DICC TRIDENT LTR
TO EPA 4/18/78

TRIDENT SUPPORT SITE FLOW GENERATION

5. The environmental ratings, even when prepared by technical experts, are subjective as to the numbers assigned. For this reason, ratings should be used as a tool or an aid, not as a final, determining factor. The computer output provided in Appendix A shows a rating sensitivity, i.e., the change in the base score of an alternative if a particular factor were to change by 10 points.

   The deficiency in the modeling only provides uncertainty as to the complete accuracy of the estimated impacts. The modeling is not perfect for any of the disposal sites. It should be noted that marine water quality ratings were determined from basic continuity equations and not Parametrix's results.

6. A review of the weightings and ratings has been conducted and several clerical errors uncovered. These errors have been corrected before presentation in the final EIS. The relative ranking of alternatives does not change. We must emphasize the need to use ratings only as a tool and that several alternatives with numerically close ratings are essentially "equally" good.

7. The apparent ponding of water at the treatment plant site seems to be caused by poor drainage due to subsoil conditions, but the water may actually be connected to the groundwater. A soils survey will be conducted prior to the preparation of detailed facility design drawings. It is expected that groundwater problems can readily be overcome by standard construction techniques and, if they cannot, the site location may be moved. This should not require a new EIS once the basic concept of the preferred alternative has been explored and accepted.

   We have never heard of a wastewater treatment plant suffering accidental spills on the property, although discharges of not fully treated waste have been known to occur due to poor operator control. This is an unlikely event that could occur at any plant at any location, but rarely occurs and would cause no lasting damage.

8. Mitigative measures for pipeline construction are discussed in Chapter VI. These measures will be adopted as discussed in that chapter and the costs are included within the cost estimates.

9. We assume you mean secondary impacts due to hookups to the Navy pipeline. At this time, the Navy interceptor from the Trident Support Site is being sized to accept only U.S. Navy wastes and no capacity is being provided for other connections except for Island Lake homes.

10. Mr. Haggard states that "Assuming a reasonable amount of receiving water, it is the jet momentum of the diffusers, not the volume of dilution water, which controls the near field dilution phenomenon and hence initial dilution." This is essentially a restatement rather than a contradiction of the discussion in the draft EIS supplement.

In a situation where dilution is dependent on two phenomena (transport of clean dilution water across the diffuser and momentum-induced mixing) the assumption that the former does not control initial dilution inevitably leads to the conclusion that the latter must. The fact remains, however, that since momentum-induced mixing can be controlled by the system designer while the transport of clean dilution water across the diffuser is subject to the vagaries of nature, it is usually the natural transport of water past the diffuser that determines the initial dilution achieved.

The momentum of the discharged wastewater that leads to mixing in the receiving waters has two components; momentum resulting from the velocity of flow through the diffuser ports and momentum resulting from the density differential between the discharged wastewater and the receiving environment. The density of the receiving water will always be much greater than that of the discharged wastewater irrespective of the temperature of the latter because the elevated density of the former is due to its salinity rather than to its temperature. Momentum resulting from the density differential will always be sufficient to induce mixing in the receiving water.

11. Three factors that limit the accuracy of the University of Washington Port Orchard model are mentioned in the draft EIS supplement: the inability to take account of wind effects and the difficulties associated with viscosity and surface tension scale effects. These limitations affect the accuracy of the model in predicting water movements at any given point more severely than they affect prediction of generalized water circulation. It is impossible to say how these limitations affect predictions of water movements in the immediate vicinity of the proposed North Port Orchard outfall, and this clearly contributes to the uncertainties regarding expected performance of the outfall. In recognition of these uncertainties, however, large safety factors have been assumed in the preliminary design and analysis of outfall systems. It is our belief that adoption of these safety factors ensures that ambient water quality will not be significantly degraded.

Reviewing Table II-4 in the draft EIS supplement, it is apparent that a secondary effluent diluted 10:1 with receiving water meets the AA standard with the exception of the bacteriological standard; the latter could be complied with readily by increasing chlorine dosage rates. Table II-13 indicates that, based on University of Washington current measurements, 100:1 or more initial dilution would occur 71 percent of the time. The precision of the measurements does not allow an accurate calculation to be made of the percent of time that initial dilution will equal or exceed 10:1, although what evidence exists suggests that it would be in the range of 95 to 99 percent. Thus, it would appear that degradation of ambient water quality is extremely unlikely.

Prior to design of the proposed North Port Orchard outfall, it would be desirable to conduct a six-month continuously recorded current-metering study, supplemented by periodic drogue or drifter studies and some measurement of seasonal changes in water column density structure. The information gathered will allow the outfall to be designed to ensure protection of the quality of the receiving waters.

12. Contrary to Mr. Haggard's assertion and based on the earlier discussion of safety factors, we believe that the information contained in Table II-13 confirms the adequacy of the North Port Orchard site.

With respect to Section 302 of the Federal Water Pollution Control Act Amendments of 1972, the effluent must be such that water quality in the receiving waters is maintained. Standard NPDES permit conditions (effluent limitations) are considered sufficient. The permit writer, Department of Ecology, will have the option of adding receiving water quaily monitoring requirements if warranted. The public will have an opportunity to review permit conditions prior to issuance.

13. The discrepancies between the dilutions calculated by Parametrix and Engineering-Science stem, at least in part, from different assumptions with respect to diffuser characteristics. We believe that the diffuser length assumption used in the draft EIS supplement conforms with good engineering practice and is justified if 100:1 dilution is the goal. It should be noted, however, that 100:1 dilution was chosen for illustrative purposes in order to compare performance of similar diffusers at different sites. It was not intended to imply that 100:1 dilution is necessarily a desirable goal. There was no scientific basis for choosing that particular number.

The rating of each disposal site on the basis of water quality is somewhat subjective. However, although it represents an opinion, it is the opinion of an educated person, specializing in that field, who has applied the best scientific information available to him. It must be remembered that the EVAL system serves as a guide to the decision makers, not as the final decision on a project alternative.

The statement on page II-5 regarding a possible dilution of 5000:1 in Port Orchard Channel relates to total dilution, that is, the product of the rapid initial dilution discussed earlier, and dilution due to currents, wind and waves throughout North Port Orchard channel.

14. We are not sure to which statement regarding the University of Washington study Mr. Haggard refers. It is stated in the draft EIS supplement that while the theoretical dispersion at Point Monroe should be greater than that at Port Orchard, this was not supported by the University of Washington model. It was not intended to imply that no doubts exist with respect to predicted circulation in Port Orchard channel.

In view of the high degree of initial dilution expected, it appears extremely unlikely that movement of the seawater-treated wastewater field into any particular area or return of the field to the discharge area with the tide will cause a violation of water quality standards. No measurable build-up of waste constituents in Port Orchard channel is expected.

15. Our conclusion that the University of Washington model studies do not support the theoretical assessment, that dispersion at Point Montor should be superior to that at Port Orchard, was based on the observation of a movie-film of dye studies conducted using the model rather than from the text of report. Regardless of the model results, it is pointed out in the draft EIS supplement that "Based on the relative exposure of the two remaining sites to large scale water movements in Puget Sound, (Point Monroe) should be the superior site," a statement that corresponds well with the University of Washington conclusion that "discharge into the main basin of Puget Sound is more desirable than discharge into the Port Orchard system."

The issue at stake is not whether dispersion at Point Monroe is greater than at North Port Orchard; it almost certainly is. The issue is whether the theoretical incremental environmental benefits of discharge at Point Monroe justify the increased costs. It is a common experience in environmental management that removal of the last vestiges of a pollutant can cost much more than removal of the mass of the pollutant. Harvesting by hand the ears of wheat remaining in a field after the combine has passed is rarely cost-effective. The question to be addressed is whether the theoretical environmental benefits of discharge at Point Monroe, as opposed to North Port Orchard, are analagous to the remaining ears of wheat; they can be harvested, but is it worth it.

16. Approximately 10,000 to 15,000 persons will reside on the Trident base. This figure is obtained from the projected housing at the site and an estimated family size of 3.3 persons per household. The on-base housing, according to the U.S. Navy, will be the principal source of wastewater flow. We have been informed that the balance will be due to some machine shops, photography processors, etc., with the largest industrial contribution to be from heating plant boiler blowdown, as shown in the response to comment No. 3.

17. The Trident flow contribution remains unchanged. On water reuse, please see the answer to comment No. 3. There would be no reduced capacity due to a decrease in Trident flow because a decrease is not anticipated.

Sewer line capacity will be based upon the 20-year design flow. This is less than commonly practiced but acceptable because higher capacities cannot be justified due to a lack of longer range population projections; also, limited capacities are in line with the local populations' concerns about unwanted, excessive growth.

18. Sludge disposal, as a part of an EPA funded treatment plant, will be in accordance with accepted practice. However, EPA will not fund sludge disposal in central Kitsap County because the landfill site is already owned by the County and is in operation. EPA involvement would occur only if there were a problem with leachate or surface runoff, which is not the case. If you read further in the guidelines you cite (to 40 CFR § 241.100 (v)), you will find that "solid wastes", the subject of the guidelines, does not include solids in sewage (sludges). The report to which you refer is the project report of a demonstration grant to the City of Oceanside, California, and is not nearly of as much application as "Recycling Municipal Sludges and Effluents on Land", July 1973 Joint Conference Proceedings. You may also wish to review the publications listed in "Land Application of Sewage Effluents and and Sludges: Selected Abstracts "(EPA-660/2-74-042, June 1974). EPA currently has not promulgated guidelines for the disposal of wastewater sludges in sanitary landfills.

The facilities planner used State of Washington standards for the design of the landfill facility. They are RCW 70.95, the State Solid Waste Management Act and WAC 173-301, the State Minimum Functional Standards. The Standards are similar to EPA's 40CFR-241 which apply only to activities on Federal Facilities.

19. Please refer to the final EIS, Chapter I, for a complete detailed cost presentation of the various alternatives according to the newest estimates presented in the final Facilities Plan.

20. An interest rate of 5 7/8 percent, current at the time of the cost analysis, is used in the final EIS in Chapter I. The rate will vary from time to time, but it is important that all of the alternatives are analyzed according to the same rate.

21. The basis is the Navy's proportion of the flow and their cost of the interceptor sewer. It is based upon design flow of sewage at the strengths stipulated in Chapter II of the EIS.

22. If effluent and receiving water monitoring were to indicate that during operation the proposed facility were causing water quality criteria to be violated, then an upgrading of the facility or a relocation of the outfall would be in order. A very rough estimate of the increased costs would range from $1.5 million capital and $0.46 million annual total based upon tertiary treatment as at Silverdale, to $5.2 million capital and $0.54 million annual total based upon the longer outfall to Bainbridge Island.

23. The facilities planner for Sinclair Inlet has indicated that the Manchester outfall site for central Kitsap's waste would probably be an undesirable solution. This is presented in a letter printed in this chapter. We concede that the Manchester site is probably superior with regard to physical impacts, but we are not convinced that this is sufficiently so and that North Port Orchard's impacts are so bad as to justify the higher cost.

24. The introductory chapter in the final EIS explains the revisions of cost necessitated by reevaluation of Poulsbo's participation and presents new, complete costs for each alternative. Alternative 11 still has substantially less cost.

Telephone 876-7152, Extension 255

KITSAP COUNTY PLANNING DEPARTMENT

ADMINISTRATION BUILDING • PORT ORCHARD, WASHINGTON 98366

DIRECTOR
ROBERT E. MITCHELL

RECEIVED
MAR 24 1976
EPA EIS

MEMORANDUM

TO: Mr. Dick Theil, Environmental Protection Agency

FROM: Robert E. Mitchell, Kitsap County Planning Director

RE: Adequacy of DEIS & SDEIS on Central Kitsap Wastewater Facilities Project for Local DEIS.

DATE: March 5, 1976

Section WAC 197-10-650 of the SEPA guidelines states that the "preparation of an EIS shall not apply when an adequate final EIS has been prepared pursuant to ...(NEPA)." The adequacy of a federal EIS is determined in part by the adequacy of specific elements of the EIS when applied locally. These specific elements are listed in the SEPA guidelines, WAC 197-10-444. Pursuant to your request, this memorandum addresses the adequacy of the treatment of these elements in the EIS on the Central Kitsap County Wastewater Facilities Plan, prepared by EPA, Region X, when applied locally. Each element will be addressed separately in the order they are listed in the SEPA outlines.

The elements are organized into two categories, "Elements of the Physical Environment", (1) and "Elements of the Human Environment", (2). The subcategories are identified by lower-case letters and the sub-subcategories are identified by lower case Roman numerals. Following each subcategory and/or sub-subcategory, is a listing of the pages in the Draft Environmental Impact Statement (DEIS) and/or Supplement to the Draft Environmental Impact Statement (SDEIS) on which the element is addressed.

If the DEIS and/or the SDEIS is not adequate, a statement to that effect is made, including the additional information or conclusions necessary to make the statements adequate.

1. Elements of the Physical Environment

   a. Earth

      i. Geology (page II-2, DEIS)

      ii. Soils (II-4, IV-29, DEIS; II-1, IV-20 SDEIS)

      As stated in the DEIS and SDEIS, the extent of change in yield of native and/or cropped vegetation brought about by the proposed alternative should remain unchanged.

iii. Topography (II-23 to 32, DEIS; II-1 to 8, SDEIS)
iv. Unique physical features

The topography and unique physical features of the study area and the proposed treatment plant sites are adequately inventoried and evaluated. Disruptions of topography and other physical features along pipe routes and at treatment plant sites will be minor and generally involve road rights-of-way.

v. Erosion (IV-6 to 7 and V-2, DEIS; IV-7 SDEIS)

The potential for erosion along pipeline routes is adequately addressed. The potential of erosion from removal of vegetation during development of sewered areas is much greater.

vi. Acretion/Avulsion - not applicable.

b. Air

i. Air quality (II-10, IV-3, DEIS; IV-3, SDEIS)

As stated in the statements, the proposed project is not expected to change ambient air quality which is currently very good.

ii. Odor (IV-5, DEIS; IV-5, SDEIS)

The proposed project is not expected to create odors in the project area, as stated in the DEIS and SDEIS.

iii. Climate (II-7, DEIS)

The proposed project will not alter existing climatic conditions as stated in the DEIS and SDEIS.

c. Water (II-58, DEIS)

i. Surface water movement (see surface water quality and quantity, below).

ii. Runoff/absorption (see soils, 2.a.ii)

iii. Floods - not applicable.

iv. and v. Surface water quantity & surface water quality (II-15 to 16, II-32 to 42, IV-3 to 33, IV-36 to 42, DEIS; II-8, II-11 to 20, IV-21 to 27, IV-85 to 88, SDEIS)

As stated in the DEIS and SDEIS, the proposed project should upgrade Clear Creek, Burkes Creek, and other streams to meet water quality indicators through reduction of septic tanks in this area. If the Island Lake area is sewered, the water quality of the lake will be upgraded also. The effects on water quality of the discharge of secondary level treated wastewaters were evaluated for each outfall site. This evaluation is more than adequate for local purposes.

vi., vii., viii. and ix - Ground water movement, ground water quantity, ground water quality and public water supplies. (II-17 to 22, IV-34 to 35, IV-43 to 44, V-13 to 14, DEIS; IV-26 to 27, IV-29 to 31, V-8, SDEIS)

Although the quality of ground water will improve with the proposed project, the quantity is expected to decline through the lowering of the water level in shallower, hand-dug wells in the study area. This impact identified in the statements will be mitigated by the expansion of public water systems. The wells in these systems will utilize water from aquifers rather than water present in the uppermost layers of the soil.

d. Flora

i., ii., and iii. - Numbers or diversity of species, unique species and barriers and/or corridors.

(II-23 to 32, II-42 to 51, IV-13 to 28, V-2 to 12, DEIS; II-1 to 8, IV-6 to 7, IV-11 to 19, IV-32, SDEIS)

The flora of the study area, the treatment plant sites, the outfall sites (marine habitats) and other surface water in creeks and lakes and the impact of the projects on flora are adequately inventoried and evaluated.

The secondary impact of loss of habitat due to development could also be mentioned. | 1

The need for effective land use controls near pipeline routes could be emphasized more. | 2

iv. Agricultural crops (IV-45, DEIS; IV-20, SDEIS)

Soil properties affecting yield of native or cropped vegetation will not be affected by the proposed project. The DEIS also includes inventories on lands used for agricultural crops, including pastures, that will be changed by each alternative, but does not rate these impacts in Section IV of the DEIS or SDEIS.

e. Fauna

i. and iii. - Numbers or diversity of species and barriers and/or corridors.

(IV-23 to 32, II-44 to 52, II-54 to 57, IV-8 to 11, IV-46, DEIS; II-1 to 8, IV-8 to 9, IV-33, IV-66 to 67, SDEIS)

The fauna of the study area, the treatment plant sites, the outfall sites (marine habitats) and other surface waters in the study area and the impacts of the project on fauna are adequately inventoried and evaluated. Construction of pipelines and the treatment plant will result in a minor decrease in wildlife habitats, as stated in the DEIS. The secondary impact of loss of habitat due to development also could be mentioned. 3

ii. Unique species (IV-12, DEIS; IV-10, SDEIS)

As stated in the DEIS and SDEIS, no long-range negative impacts are anticipated as a direct result of the project. However, a secondary impact of increased densities of development may be loss of habitat for the mountain lion and fisher. 4

iv. Fish or wildlife habitat (III-8, IV-13 to 28, IV-47, V-4 to 12, DEIS; IV-11 to 19, IV-34, IV-68 to 84, V-10 to 15 SDEIS)

As stated in the DEIS, the greatest impact will be on marine habitats in the vicinity of the treatment plant outfall. These impacts and mitigating measures for negative impacts are adequately inventoried and evaluated.

f. Noise (II-4, DEIS; IV-4, SDEIS)

The minor negative impact of plant operation and the temporary negative impact of construction noise are adequately addressed.

g. Light and Glare - not applicable.

h. Land use (II-74, IV-74 to 76, IV-76, VII-2, DEIS; IV-53 to 55, IV-57, IV-101, VII-2, SDEIS)

The DEIS rates the compatibility of the treatment plant site alternatives with the planned land use in the area but does not adequately address the relationship between the Clear Creek pipeline route and land use along the pipeline.

The statement is made that the plan will "assist the local jurisdiction to direct development to areas designated for growth...by providing service in desired areas and denying access in other areas". However, as stated in the SDEIS, "...all the land bounding Clear Creek is designated as rural. An interceptor traversing this area will tend to induce development which might not otherwise occur." Denying access in this area, as suggested by the DEIS, would be difficult. The SDEIS continues as follows: "In fact, it was in large part due to these concerns, expressed by the public, that (the eleventh) alternative was put forward. Alternative 11's routing of the pipeline from Trident will avoid the Clear Creek area and thus obviate any potential growth-inducing impacts". Although the above statements are not questionable, the SDEIS also states that "(T)here are no foreseeable growth pressures along this alternative pipeline route". A more correct statement would be that there will be growth pressures along any pipeline route. Denying access along alternative 11's route will be just as difficult as denying access along the Clear Creek route. 5

i. Natural resources (IV-42 to 47, DEIS; IV-29 to 34, SDEIS)

i. Rate of use

ii. Non-renewable resources

See also sections on flora, fauna, earth, air and water above.

As stated in the DEIS and SDEIS, the impact on natural resources will be negligible or slightly positive, except for the quantity of potable water available which will be slightly reduced. Water is a renewable natural resource, and other sources in addition to shallow wells will be developed to serve the project area.

j. Risk of explosion or hazardous emissions - not applicable.

2. Elements of the Human Environment

a. Population (II-70 to 72, II-75 to 83, IV-58, IV-80-81, VII-2, DEIS; II-24 to 28, IV-45, IV-59, IV-102 to 103, VII-2 SDEIS)

Since the publication of the draft EIS, the population projections made by the cost-revenue consultant have been received. These projections were compared to the projections made by COPSG. A revised population projection from COPSG is expected in March. This projection will be reviewed and, if acceptable, adopted as the official projection for Kitsap County, and forwarded to EPA, URS, and SES.

On page II-83 of the draft EIS, the statement is made that, ..."the distribution of the increased population is expected to diffuse within the limits imposed by the County plan, with concentration along the major transportation corridors and pipeline routes". It should be noted that the County plan may not suggest population growth along all corridors and pipeline routes, especially those in areas designated in the County plan as rural.

b. Housing (II-64, II-74, IV-65 to 73, V-16 to 20, DEIS; IV-50 to 52, IV-98 to 99, SDEIS)

The 1970 inventory of land use is adequate for the study area. A more recent land use inventory was made by COPSG; however, this inventory is available only for the County, and cannot be disaggregated to the study area.

Prediction of impacts on residential values and tax rates is particularly useful to local agencies. Although the DEIS does not address the effect of a sewer on housing densities nor does it compare the purchase price of a dwelling unit served by sewer to the cost of a unit with on-site sewage disposal, both housing density and cost were adequately addressed in the cost-revenue alternatives study. Housing is also addressed indirectly through discussion of land use in 2 (h.) above.

c. Transportation/circulation (II-65, IV-56, IV-90, DEIS; IV-43, IV-64, SDEIS)

i. Vehicular transportation generated

As stated in the reports, the impact of the construction of the sewage plant will have a temporary, minor impact on traffic. No additional local impacts are anticipated. The operation and maintenance of the sewage treatment plant will generate even less traffic.

ii. Adequate parking facilities

Parking facilities for the plant will be provided as stated in the DEIS.

iii. Transportation systems (IV-56, DEIS)

As stated in the DEIS, the existing treatment plant sites will be served by existing access roads, which at most may require limited widening or repair. New sites may require construction of short access roads and possible lighting.

iv. Movement/circulation of people or goods - not applicable.

v. Waterborne, rail & air traffic - not applicable.

vi. Traffic hazards - not applicable.

d. Public services (II-60, II-63 to 64, DEIS; II-20 to 22, SDEIS)

i., ii., & iii. - Fire, police and public schools

As stated in the DEIS and SDEIS, fire, police and public schools are available in the study area. Although the population increase in the area will increase the demand on these services, the cost/effectiveness of providing these services to each household should improve.

iv. Parks and recreation (see i. below)

v. Maintenance (II-69, IV-59 to 60, DEIS; II-23, IV-46, IV-93, SDEIS)

As stated in the DEIS and SDEIS, municipal costs of operating and maintaining the sewer system will stay the same or increase slightly. This evaluation is adequate for local purposes.

e. Energy

i. & ii. Amount required and source/availability

The amount of electrical power required for operation of the sewage collection and treatment is available from Puget Sound Power and Light. Although the alternatives vary in the amount required for transportation of the effluent, this difference is not considered to be a significant factor in selection of the alternative.

f. Utilities

i. Energy (II-60, IV-48 to 49, DEIS; II-20, IV-35 to 36, SDEIS)

As the DEIS and SDEIS state, electricity and gas are primary sources of energy and are adequate for project demands as well as all Trident related demands.

ii. Communications (II-60, DEIS; II-20, SDEIS)

Although telephone service is provided throughout the study area, service is provided by two companies. Therefore, calls between the two service areas are long distance, inconveniencing users and increasing the potential delay in obtaining emergency services. Although communications in the project area are less than satisfactory, the proposed project will have no effect on this utility.

iii. Water (IV-50, DEIS; IV-60, IV-37, SDEIS)

The DEIS and SDEIS state that the proposed project will not increase demands on the local water supply systems, that is, the Silverdale and North Perry Water Districts, the Poulsbo and Bremerton water systems and the Public Utility District system in Keyport. However, it is evident that sewer service requires water service. The sharp increase in demand for sewer will be accompanied by a moderate increase in demand for water.

iv. Sewer (II-60 to 62, III-1 to 8, III-11 to 30, IV-55, DEIS; II-21, III-5 to 13, IV-42, SDEIS; Cost of sewer IV-59 to 71, DEIS; IV-46 to 52, SDEIS)

The DEIS and SDEIS state that the project will significantly augment the existing system on a continuing basis at comparatively small initial cost to the County and ongoing cost to the County and system user. The construction of the sewer is also a means of implementing a comprehensive land use plan, which when implemented cannot be altered. Therefore, sewer construction is correlated with an irreversible change in land use patterns.

v. Storm water (IV-54, DEIS; IV-41, IV-91, SDEIS)

The DEIS and SDEIS rate the degree to which the proposed project imposes demands for drainage and flood control on surrounding properties and local flood control system. However, an indirect impact of the project will be the increase in storm water runoff as a result of increases in the density of residential development.

vi. Solid waste (III-8, 10 and 11, DEIS; III-4, SDEIS)

As stated in the DEIS, the treatment of wastewater results in the production of sewage sludge. Although the amount of sludge is small when compared to the total solid waste generated in the County, land disposal of the sludge is preferred to incineration. Should the County's plan to construct a land disposal site be altered, for example, to a resource recovery system, a land disposal site would still have to be maintained for disposal of the sewage sludge.

g. Human health

i. Public health (including mental health) - (II-63 to 64, DEIS; II-22, SDEIS)

As implied by the reports, the impact on public health is secondary.

ii. Environmental health (IV-51, DEIS; IV-38, IV-90, SDEIS)

The degree to which the proposed project reduces environmental health hazards and demands on the environmental health division of the local health district is adequately addressed.

h. Aesthetics (II-83 to 84, IV-85 to 89, V-21 to 24, DEIS; II-29, IV-63, IV-105 SDEIS)

As stated in the report, the aesthetic and visual impact of a sewage treatment plant will vary greatly with its location. The visual impact of a pipeline is less and will decrease in time as indigenous ground cover is replaced.

i. Recreation (II-58, IV-52 to 53, IV-83 to 84, DEIS; IV-39 to 40, IV-62, IV-104, SDEIS)

The beneficial impact of all alternatives on water recreation and potential for trail development is adequately addressed.

However, a secondary impact not addressed in the report, will be the change in type of recreation facilities demanded, as a result of increases in densities of development. Removal of the Silverdale Sewage Treatment plant from the Silverdale waterfront park will also improve the recreational value of this facility.

j. Archaeological/historical (II-74, IV-82, DEIS; IV-61, SDEIS)

The impact of the proposed project on archaelogical and historical sites is negligible, as stated in the report.

REM/JCT/MTH/tlh

Response to comments from Kitsap County Planning Department:

1. There will be a secondary loss of wildlife habitat due to development, however, it is our conclusion that each development will be due to natural and Trident-induced growth. Project induced growth in the study area would be negligible.

2. We agree that there is a need for effective land use controls near pipeline routes. This was most sharply demonstrated by the debate over the Clear Creek interceptor route. Conclusions of that debate were that land use designation should be provided by the Kitsap County Planning Department and that designation enforced by Kitsap County officials.

3. Please see the response to comment No. 1.

4. We believe the contrary to be true. Higher density development concentrates the population and keeps people from encroaching upon natural areas. A population density of one family per acre is just as damaging to fishers and mountain lions as a density of three to four families per acre, and it requires more land area.

5. Growth may ultimately occur along the Luoto Road pipline route if excess sewerage capacity is provided in the interceptor sewer. However, a deliberately planned lack of excess capacity would retard growth pressures. Further, it was felt that the Clear Creek area was contiguous with the business district of Silverdale, a positive growth inducing factor, while the Luoto Road route has less such attraction.

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT. CORPS OF ENGINEERS
PO BOX C-3755
SEATTLE. WASHINGTON 98124

NPSEN-PL-ER

8 OCT 1975

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

We have reviewed the draft environmental impact statement on the Central Kitsap County Wastewater Facilities, Washington, EPA Project C-530494-01. We have the following comment.

We would like to remind you that under Section 10 of the River and Harbor Act of 1899, a Department of the Army permit will be required for any of the nine alternatives that are still being considered.

Thank you for the opportunity to comment on this statement.

Sincerely yours,

Fred H. Weber

FRED H. WEBER
Assistant Chief, Engineering Division

RECEIVED
OCT 9 1975
[illegible]

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT. CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE. WASHINGTON 98124

NPSEN-PL-ER

2 [illegible] 1976

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

We have reviewed the supplement to the draft environmental impact statement on the Central Kitsap County, Washington, Wastewater Facilities, EPA Project C-530494-01, with respect to the Corps of Engineers' areas of responsibility for flood control, navigation and hydropower. We have the following comment.

We would like to remind you that a Department of the Army permit will be required for all construction in, over and beneath all navigable waters of the United States, or adjacent wetlands.

Thank you for the opportunity to comment on this statement.

Sincerely yours,

Fred H. Weber
[illegible]
[illegible] Engineering Division

RECEIVED

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ARCADE PLAZA BUILDING, 1321 SECOND AVENUE
SEATTLE, WASHINGTON 98101

October 14, 1975

REGION X
Office of Community
Planning and Development

IN REPLY REFER TO:
10D

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Subject: Environmental Impact Statement Central Kitsap County Wastewater Facilities

We have reviewed the statement submitted with your September 5, 1975 letter requesting comments by October 20th.

The proposed project is the construction of interceptor sewer lines, wastewater treatment facility and waste water disposal facility to service central Kitsap County and the Trident support site.

We have some concerns in the area of overall coordination. The County is presently developing a growth study, which is scheduled for completion in June of 1976. This growth study will be based on the Arthur D. Little study, which has just recently been completed. It would appear to us that to commit this project to a specific alternative before the development of the growth policy could defeat the purpose of the policy. 1

The Arthur D. Little study contains a method for cost revenue evaluation of growth. Although the E.I.S. contains a similar method, we suggest that each alternative be evaluated using the ADL methodology since it will be used by the County to consider alternate growth policies.

The E.I.S. does not evaluate the cost alternatives of a limited access growth policy. This could result in unacceptable user costs. 2

From a technical standpoint we concur in your analysis that your most favored site at Manchester would achieve better effluent diffusion than your next favored site at Brownsville.

Although the Brownsville site shows significantly lower annual cost, in the long run this may not be significant in that this location is not favorable from the standpoint of meeting ultimate treatment facility needs. Again, in a large part the ultimate needs would be dependent upon the County's growth policy. 3

Thank you for the opportunity to comment on your statement.

Sincerely,

Robert C. Scalia
Assistant Regional Administrator

Response to letter from U.S. Department of Housing and Urban Development

1. The County is making every effort to coordinate and synchronize the numerous planning and capital-improvement elements included in its Trident Impact Planning Program (TIPP). The Central Kitsap Sewer Facilities Plan is one of these elements. The benefits to be derived or risks avoided by delaying action on an individual component until action on the overall program has reached completion, must be weighed against the consequences of that delay.

   Ideally, it might be desirable to freeze everything in place until all necessary planning is complete (including growth studies such as that of A. D. Little). Unfortunately, the press of events in the real world does not afford the luxury of such an approach.

   Even were the Navy directed to freeze its Trident construction program in place until such time as County planners had devised the ideal growth management system, Trident is not the only concern. The Central Kitsap sewer facilities being analyzed in this EIS were needed long before the Trident project was announced and would now be in place had not Trident been added to the system. Planning decisions and building commitments in the original service area were made in anticipation of a 1976 target start-up date.

   Among the numerous consequences of further delay are the costs of maintaining a number of marginally effective interim sewage facilities serving a number of new subdivisions in the central area. The County permitted the installation of these interim facilities and accepted responsibility for their operation based on the expectation that the regional system would soon be on line. The longer these interim facilities have to remain in use the greater the frequency of breakdown and the consequent public health hazards and higher public costs of repair. There are other consequences of delay affecting the location, design and timing of new developments and new housing costs which are just as serious.

2. A principal reason for concern with a limited access policy was the possible location of the Trident Support Site interceptor in Clear Creek Valley. This is not a concern with the recommended alternative, which routes the pipeline along the northern edge of the study area and away from anticipated growth areas.

   As HUD may be aware the original service area and proposed routing of trunk lines for the Central Kitsap facility were designed to serve areas where substantial housing development activity was occurring and in keeping with County planning policy. It is the addition of the trunk line from Bangor and routing of that line through areas currently designated as rural to link up with the original regional system which raises questions regarding a limited access policy. The fact of the matter is that policy regarding access in this particular instance will not necessarily affect user costs, and certainly not negatively. The Navy, in order to transport its wastewater to the County's regional treatment facility, will pay the full costs of the trunk lines and operating costs its loads will require. If the County desires to increase the size of the pipe linking Bangor to the regional disposal site in order to accommodate local collector line hook-ups along that route, it has the option of doing so, if in accordance with duly adopted plans. The resulting user charges would be based on the capacity added to the line primarily designed for Navy loads. These costs are expected to be lower than would be expected if the same capacity were built on its own.

3. There is no evidence to support the contention that the proposed Brownsville site would not meet ultimate treatment needs. If and when the EPA or Washington State establishes higher treatment level requirements, the additional unit processes can be added at the facility site. In terms of ultimate growth, the plant site is well located with regard to the three expected growth centers: Trident, central Kitsap County and Poulsbo.

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
ARCADE PLAZA BUILDING, 1321 SECOND AVENUE M/S 317
SEATTLE, WASHINGTON 98101

February 26, 1976

REGION X
Office of Community
Planning & Development

IN REPLY REFER TO:
10D

RECEIVED

Richard R. Thiel, Chief
Environmental Impact Section
M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Dear Mr. Thiel:

Subject: Supplement to D.E.I.S. Central Kitsap County Wastewater Facilities

We have reviewed your supplement and have no further comments.

Sincerely,

Robert C. Scalia
Assistant Regional Administrator

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

PEP ER-75/884

NOV 11 1975

Dear Dr. Smith:

Thank you for the letter of September 5, 1975, requesting our views and comments on the draft environmental impact statement for Wastewater Facilities, Central Kitsap County, Washington. Although the document adequately addresses most impacts, additional information is needed to assess possible environmental impacts resulting from the proposal relative to the jurisdiction and expertise of this Department.

The draft statement is written on ten alternatives. However, the proposed project has not been selected from the ten alternatives. The "...major Federal action significantly affecting the quality of the human environment, ..." is the specific project to be implemented, rather than the ten alternatives studied. A separate draft environmental statement on the specific project should be considered to present the anticipated impacts in greater detail than the generalized summary findings contained in this statement. 1

From the standpoint of safeguarding fish and wildlife and particularly marine resources, the disposal characteristics of alternative plan No. 9 are such that there would be a minimum of contact between marine organisms and high concentrations of wastewater effluent. Consequently, we urge thoughtful consideration of adopting this alternative as the project plan. 2

Alternatives 3 and 4 call for discharge of treated effluent south of Fay Bainbridge State Park. There is, however, nothing to substantiate the conclusion that the project would have a neutral effect on parks and recreation in the area. Would the project cross park lands? What would be the effect on aesthetic and physical environments of the park? What recreation facilities would be disturbed or destroyed and what mitigative measures would be proposed? What effect would the discharge effluent have on local swimming, boating and beach combing at the park? Answers to these questions are necessary to determine the impact on Fay Bainbridge State Park. 3

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Figures III-6 and III-7 indicate that Alternatives 3 and 4 might intrude on Kitsap County's Keyport Park. The same questions are also applicable to this park. Use of any of Keyport Park for project purposes would require the prior approval of the Secretary of the Interior. This is required because the County obtained this former Federal surplus property from the United States exclusively and in perpetuity for public park and recreation purposes and it is so restricted by a deed covenant. We would consider a request for a non-recreation use, as might be required by the project, only if it could be shown that there is no feasible and prudent alternative and there would be no interference with the public park and recreation purposes of the park.

Chapter IV, page IV-84; Chapter V; and Chapter VI need revision to reflect these concerns regarding these two parks.

Bicycling is a growing and popular activity for Kitsap County residents and visitors who pursue it both as a means of recreation and transportation. The increased population generated by the Trident project can be expected to create more demand for bicycle facilities. Likewise, a similar situation exists regarding hiking trails and walkways in the county.

This project presents an excellent opportunity to incorporate hiking and/or bicycling paths along interceptor sewer lines. To fully realize the potentials of this opportunity, we suggest that the following be considered:

1. Recognition of public recreation and non-motorized transportation as one of the interests in land acquired by the applicant for construction of the interceptor sewers.

2. A sufficiently wide right-of-way or easement for these purposes.

3. A center line location of the easement or right-of-way selected to include walking and bicycling as one of the determinants of horizontal and vertical alignment. 4

4. Coordination with the Kitsap County and Washington State Trail Plans prepared pursuant to Washington State Law. Information on the State plan is available from:

Interagency Committee for
Outdoor Recreation
4800 Capitol Boulevard
Tumwater, Washington 98504

Information on the county plan is available from:

Kitsap County Board of Commissioners
614 Division Street
Port Orchard, Washington 98366

5. Investigation of other Environmental Protection Agency grant projects in the Eastern United States that have incorporated bicycling and hiking facilities. In addition to the EPA Regional Administrators for Regions I and III, you may wish to contact:

Maurice D. Arnold, Regional Director
Bureau of Outdoor Recreation
Northeast Region
Federal Office Building
600 Arch Street
Philadelphia, Pennsylvania 19106

The area of the proposed wastewater facilities is located in seismic risk Zone 3, where major destructive earthquakes may occur. We suggest that the seismicity of the region and its implications for siting and design of the facilities be discussed in the environmental statement. 5

Primary effects of the project on fresh and marine surface waters appear to have been adequately considered. However, the effects of future development of the service area which is likely to be encouraged by the project should be discussed in the statement. 6

Page III-11, second paragraph. The following statement needs further consideration: The clay layer, a liner under sanitary landfill used for disposal of partially digested and centrifuged sewage sludge, "may be accompanied by a leachate collection and treatment system (similar to a wastewater treatment facility) and if the clay layer is not present must be substituted by such a system." Examination of the geology and geohydrology of the project area as described in the environmental statement and as presented in Bulletin No. 18 of the State of Washington Department of Conservation, Division of Water Resources, indicates that extensive continuity and retention of hydraulic integrity of layers of low permeability cannot safely be assumed in the project area. We suggest therefore the further consideration of the need for a clay liner protected against damage beneath all sludge-disposal landfills, if the sludges are processed as described, because only heat-treated and dried sludge can be expected not to yield viruses or other pathogens.

Pages IV-34, IV-35, IV-43, IV-44. We agree that water levels will probably locally decline to some extent as a result of the implementation of the project; however, we suggest the need for considering the possibility that such declines will probably prompt increasing use of the deeper aquifers and thus produce a secondary impact. Inasmuch as ground water seems to be the only significant source of water supply, discussion of such an impact seems appropriate. 7

Although the document does not discuss mineral resources, we know of only sand and gravel deposits within the project area. However, the proposed pipeline routes should not adversely affect these deposits.

The section on "Irretrievable Commitment of Resources" should note that there would be a commitment of construction materials for building the proposed facilities. 8

The statement does not indicate that the Washington State Historic Preservation Officer has been consulted to determine if sites eligible for the "National Register of Historic Places" are located in the study area. This consultation should be made and the results reported in the environmental statement. 9

We also suggest that the statement report procedures to be used for the preservation and enhancement of historic and archeologic properties during the proposed construction.

Sincerely yours,

Stanley D Doremus

Deputy Assistant Secretary of the Interior

Dr. Clifford V. Smith, Jr.
Regional Administrator, Region X
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

United States Department of the Interior

OFFICE OF THE SECRETARY
PACIFIC NORTHWEST REGION
P.O. Box 3621, Portland, Oregon 97208

March 18, 1976

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Regional Administrator
U. S. Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Dear Sir:

We have reviewed the Supplement to the Draft Environmental Statement for Wastewater Facilities, Central Kitsap County, Washington, and have the following comments for your consideration in further preparation of the environmental impact statement.

From the standpoint of protecting fish and wildlife resources and habitat, Alternate 11 appears to be the least damaging. This is particularly true since it would eliminate encroachment of an interceptor sewer line along Clear Creek drainage basin thus eliminating disruption of aquatic and riparian habitat. 10

It should be noted in the Jurisdiction Section (page II-21) that Kitsap County also includes the Port Madison and Port Gamble Indian Reservations. In further regard to Indian lands, it is noted that Alternatives 3 and 4 would entail construction of a sewer line through a portion of the Port Madison Indian Reservation. It is suggested that project coordination be initiated with these tribes prior to any construction activities. 11

Thank you for the opportunity to comment on this document.

Sincerely yours,

Charles T. Hoyt
Special Assistant to the Secretary

Response to letter from U.S. Department of the Interior

1. A supplemental draft environmental impact statement covering the new alternative has been presented to the public.

2. Although it appears from initial calculations that disposal at Manchester (alternative 9) would provide better dilution and dispersion of the treated effluent, it cannot be proved that this improvement is significant. This is particularly true when compared to the Port Orchard channel discharge of the preferred alternative, where treatment levels and dilution and dispersion would be adequate to ensure that water quality criteria are met.

3. The discharge of treated effluent south of Fay Bainbridge State Park would meet water quality criteria and thereby be compatible with all adjacent water-oriented activities and uses. Letters received from the Washington Department of Fisheries and the Parks and Recreation Commission expressed intent to more intensely develop recreational uses and clam harvesting in the vicinity of the State Park. Concerns of these agencies could be alleviated by the proper construction and operation of the wastewater treatment and outfall facilities. However, the preferred alternative does not impact that area.

4. Development of public recreational opportunities could occur equally well with any of the proposed alternatives and the preferred alternative. While not currently part of the design plans, these opportunities can be added as plans are developed in more detail and as interest in them is expressed by the public and by County officials. Selection of the preferred alternative was based principally on other considerations, but the preferred plan does not preclude development of recreational uses.

5. The seismic hazard to the proposed wastewater treatment and transmission facilities will be incorporated in the design of the facilities according to Washington State and current professional technical standards.

6. It has been concluded that future development in the study area will be due to the Trident Support Site and will be insignificantly due to the wastewater management system.

7. Our cursory examination indicates that groundwater supplies should be adequate to serve the projected population in the study area.

8. In comparison to the total construction activities anticipated as a result of the Trident Support Site induced growth, the commitment of materials and resources to the wastewater treatment faci-

lity and transmission lines would be insignificant.

9. The archaeological survey results do state that the National Register of Historic Places has been consulted and also that no archaeologically or historically important features are in the immediate vicinity of the proposed project. Construction of almost all pipelines within highway right-of-ways and easements will keep construction activity away from other areas. See also comments of the Washington State Historical Preservation Officer later in this chapter.

10. Alternative 11 is the proposed project, and this concern is therefore satisfied.

11. If an alternative other than Alternative 11 is selected by the County, involving routes through the Port Madison Indian Reservation, the County would be required to coordinate the project with tribal officials well prior to any construction activities.

CLEAR CREEK COMMUNITY IMPROVEMENT CLUB

October 27, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Wa. 98101

Re: Draft Environmental Impact Statement, Central Kitsap County Wastewater Facilities

Dear Mr. Thiel:

At the regular meeting of the Clear Creek Community Improvement Club on October 4, 1975 it was adopted that the following comments be made in response to the Draft Environmental Impact Statement for the Central Kitsap Wastewater Facility:

1. In assessing impact of the various alternatives the negative environmental effect of sewer induced population growth near to Clear Creek is discounted because current land use planning designations of the area are rural/ agricultural. We consider this assumption is in error and should be reconsidered. It is the County's stated objective to designate the Clear Creek Valley as transitional if a sewer line is run down the valley. This objective was put into public record by the Planning Commision at the public hearing on the Interim Planning Policy. To assume the County would not redesignate the valley to transitional once a sewer line was installed is not reasonable. Further, it should not be assumed the County would size the line to only handle Bangor sewage without a specific commitment from the County.

2. A second assumption which we feel is in error is that development immediately adjacent to the Creek would not be permitted. Until the County takes action to procure a buffer zone along the Creek or legislates a buffer zone, it should be assumed in assessing environmental impact that such development will occur once the sewer is in place.

3. Under mitigative measures to protect Clear Creek ecology routing of the Bangor interceptor so it does not pass down the Clear Creek valley should be included. Such alternative routings exist and may be more economical, less ecologically harmful, more advantageous to orderly development, and less disruptive to agricultural activities. Our letter to URS company dated August 6, 1975 (copy attached) lists several examples of these alternatives.

4. An eleventh alternative is currently under consideration by the URS company. This eleventh alternative routes Bangor sewage to Keyport in lieu of Silverdale. It is requested that this eleventh alternative be included in the environmental impact statement.

Respectfully,

C.R. Walworth

C.R. Walworth
President

Copy to:
Mr. Gene Lobe
Mr. Bill Mahan
Mr. Frank Randall
Mr. Steve Fusco

Response to letter from Clear Creek Community Improvement Club

1., 3. and 4. According to a personal communication with Ms. Peggy Hollenbeck of the Kitsap County Planning Department, there is no plan at this time (24 November 1975) to change land-use planning designations in Clear Creek Valley. Also, the interceptor line down Clear Creek Valley would be under U.S. Navy control, and access would require U.S. Navy approval. However, it is recognized that policy decisions are not cast in concrete and may change as future circumstances warrant. For this reason, the recommended alternative was developed, and it would circumvent the entire question of Clear Creek Valley development. Under the recommended alternative, population growth in Clear Creek Valley would be influenced by other factors and controlled through the zoning process.

2. According to the Kitsap County Planning Department (referenced above), the Washington State Department of Fisheries is maintaining a close watch to protect the spawning grounds in Clear Creek. Existing legislation is adequate to protect Clear Creek from damaging development, and the area is being monitored to assure compliance.

NORTHWEST STEELHEADERS COUNCIL
of
TROUT UNLIMITED

BREMERTON CHAPTER
P. O. Box 2252
Bremerton, Washington, 98310

November 9, 1975

Environmental Protection Agency
Richard Thiel
Public Affairs Office
1200 Sixth Ave.
Seattle, Washington

Dear Sir:

We are a group that is dedicated to the protection and enhancement of the cold water fishery and as such are very interested in the proposed sewer project and its affect on Clear Creek.

We are against any alternative that would disrupt the fish or spawing beds that are in the creek. If the creek is involved in the final alternative we recommend that the Washington State Fisheries Program of stream rehabilitation be incorporated.

We want to be involved in any future public meetings on this subject and would like to be notified of time and place.

If you have any specific questions for our group or we can help in any way please call or write.

Thank you.

Phil Waaga, Director
Bremerton Chapter NWS
3927 Valley Drive
Bremerton, Wa. 98310
Phone: 377-7837

Bernie Whittaker, Director
Bremerton Chapter NWS
1921 9th St.
Bremerton, Wa. 98310
Phone: 373-4716

Sincerely,
Phil Waaga
Bernie Whittaker

Phil Waaga
Bernie Whittaker

cc: Steve Fusco

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EPA [illegible]

Lemolo Community Club
A Non-Profit Corporation
Rt. 6 Box 6534
Poulsbo, Wa 98370

PRESIDENT.................. ALFRED T. HARRIS
VICE PRESIDENT........... ADRIAN O. HUDLER
SECRETARY........... MARJORIE M. FISCHER
TREASURER................ CLAUS NORDLUND

February 17, 1976

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington. 98101

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Dear Mr. Thiel:

We have reviewed the supplement to the Draft Environmental Impact Statement, i.e., Central Kitsap County Wastewater Facilities, EPA Project No.C-530494-01. We wish to make the following comments.

There is repeated reference to Poulsbo's and Lemolo's wastewaters, page 111-1 and raw wastewater from Poulsbo and Lemolo, page 111-4 and 111-5.

Although Lemolo is located with-in the Poulsbo planning area, Poulsbo is not currently handling raw wastewater from the Lemolo area nor is such service needed or contemplated in future. 1

Lemolo, unincorporated, is a sparsely populated community located east of Poulsbo. The Kitsap County Planning Department has designated this area on their comprehensive planning map as rural. The Kitsap County Health Department, after conducting tests in the area, have found that septic tanks are adequate to handle the sewage needs of the area. In fact one County official has stated that the Lemolo area will not need to be sewered for at least 50 years, if at all. Providing a sewage facility that could serve the Lemolo area could be an expensive mistake. For this reason we suggested to the URS Company an alternate route for Poulsbo to join the regional system. This route, instead of going through Lemolo and across Liberty Bay would go around the west side of Liberty Bay and down highway 303 to the interceptor line. We understand the URS Company has stated that this route would be too expensive. We feel, that do to the fact that this route would take the sewage line through the Poulsbo Junction area, which will need sewers and is in a transitional zone that is destained for a higher population density, it would make sense to review the feasability of this route as opposed to going through a rural area. 2

Sincerely,

Dewey K. Smith

Dewey K. Smith
Director
Lemolo Community Club

DS:mf

cc:Mr. John Strasburger-Attorney
Mr. Steve Fusco-URS Company

Response to Lemolo Community Club

1. It is well recognized from the responses to the Poulsbo facilities plan which EPA has been receiving that the Lemolo citizens do not anticipate the need to be sewered in the near future. However, proper planning of sewer service for the greater Poulsbo area would indicate future densities in the Lemolo vicinity may well require sewer service. For this reason, a modest reserve capacity has been planned for in any interceptors serving the Poulsbo planning area. This capacity would not need to be utilized if the loads or demand were never realized.

2. The feasibility of that route was reviewed in both the Central Kitsap County and Poulsbo facilities plans and found to be not as cost-effective as the Keyport Narrows crossing. The Narrows route also has the advantage of more easily providing service to Keyport and the Keyport Naval Torpedo Station should this be desirable in the future.

CH2M
HILL
engineers
planners
economists
scientists

26 March 1976

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Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

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Dear Mr. Thiel:

Subject: Environmental Impact Statement
Central Kitsap Facilities Plan
C-530494-01

The potential for impact in the Sinclair Inlet sewerage planning area as a result of proposed alternatives for the central Kitsap planning area leads me to comment on your *Supplement to the Draft Environmental Impact Statement* for the central Kitsap project. My primary concern is with the acceptability of alternative plan No. 9--treatment of the combined flows of central Kitsap and Sinclair Inlet at Manchester--to the entities within the Sinclair Inlet study area.

Preliminary information presently under study by CH2M HILL indicates that joint treatment at Manchester would be more costly to our study area than other acceptable options. Further, it does not appear that significant water quality benefits will be realized by treatment at Manchster over other available treatment alternatives for our study area. These preliminary conclusions will be tested shortly by ecological modeling.

If our preliminary conclusions are verified through the ecological modeling, we intend to recommend that the entities in the Sinclair Inlet planning area give no further consideration to joint treatment with the central Kitsap planning area at the Manchester site. This recommendation would be primarily based on the added costs to Sinclair Inlet entities of such an alternative. We will seek written verification of this position from the City of Bremerton as soon as we are able to present the relevant facts concerning the situation to the commissioners. I hope that such a written response can be in your hands by 12 April 1976.

Seattle Office 1500 114th Avenue S.E. Bellevue, Washington 98004 206/453-5000

Until a written statement of policy can be obtained pursuant to a review of the alternatives by the Bremerton commissioners, I can only offer this letter indicating the general direction the Sinclair Inlet study is headed. I hope the information transmitted herein will provide valuable guidance to your efforts until a formal policy statement can be obtained.

Thank you for the opportunity to comment on this project.

Sincerely,

William T. Dehn

William T. Dehn, P.E.
Project Manager
Sinclair Inlet Sewerage
Facilities Plan

cc: Mr. Frank Randall, Kitsap County
Mr. Fred Schoneman, City of Bremerton

lgb

CITY HALL

City of Bremerton

WASHINGTON

THE OLYMPICS

239 FOURTH STREET

GLENN K. JARSTAD
MAYOR AND COMMISSIONER
OF PUBLIC HEALTH AND SAFE

ROBERT B. STEWART
COMMISSIONER
OF FINANCE AND ACCOUNTING

FRED S. SCHONEMAN
COMMISSIONER
OF PUBLIC WORKS AND UTILITIES

G. C. YEADON, SR.
CITY CLERK
AND PURCHASING AGENT

April 12, 1976

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

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Dear Mr. Thiel:

SUBJECT: Environmental Impact Statement
Central Kitsap Facilities Plan
C-530494-01

This letter is provided in response to your request for comment on the Supplement to the Draft Environmental Impact Statement for the Central Kitsap County facilities plan. It is a statement of the City of Bremerton's policy regarding combined treatment with the Central Kitsap planning area at the Manchester location (alternative plan No. 9 in the subject document).

A review of the probable costs to the City of Bremerton is its participation in a joint treatment facility at Manchester indicates that costs over the planning period may exceed those of other available options by as much as 35 percent. Other less costly alternatives appear to meet water quality regulations based on results of the EPA's ecologic model of Puget Sound. These other alternatives will allow the city to continue treatment using at least one of its present treatment plants.

For these reasons, the City of Bremerton is opposed to the concept of joint treatment of its wastewater at the Manchester site with Central Kitsap County. We suggest that you proceed with other alternatives for the Central Kitsap area that do not include the City of Bremerton.

Thank you for the opportunity to comment on this project.

Sincerely,

Glenn K. Jarstad
GLENN K. JARSTAD
MAYOR

Robert B Stewart
ROBERT B. STEWART
COMMISSIONER OF FINANCE

Fred S. Schoneman
FRED S. SCHONEMAN
COMMISSIONER OF PUBLIC WORKS

vlb

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PAUL R. CRESSMAN
DONALD A. CABLE
WILLIAM L. HINTZE
JOHN D. BURGESS
DOUGLAS R. HARTWICH
ROBERT E. HEATON
JOHN H. STRASBURGER
DONALD W. FERRELL
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KENNETH L. MYER
JOHN F. KALBEN
ROBERT S. JAFFE
JOSEPH D. PUCKETT
MARGARET A. EVANS
STEVEN W. HALE

October 20, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle WA 98101

Dear Mr. Thiel:

Re: Draft Environmental Impact Statement,
Central Kitsap County Wastewater Facilities

We have read with interest the Draft Environmental Impact Statement. The Draft Statement indicates that it was based on the Draft Facilities Plan by U.R.S. We have previously commented on that plan and enclose a copy of our letter dated July 25, 1975, addressed to Dr. Gary R. Minton. Many of the comments in that letter are equally applicable to the Draft Environmental Impact Statement.

Specifically, we would like to reiterate the following points:

1. Neither the Draft Facilities Plan nor the Draft Environmental Impact Statement adequately examine the economic advantages of regionalization. The Draft Environmental Impact Statement does make a partial attempt to do so in the areas of maintenance and operation costs but does not take into consideration the cost savings that would result if Poulsbo did not construct a new sewage treatment plant or a new effluent outfall. In order to rank the regional and nonregional alternatives based on cost, the cost of a nonregional Poulsbo plant would have to be added to the estimated nonregional alternatives for Central Kitsap or some other adjustment made so that a fair comparison of the relative costs was made. 1

2. The Draft Environmental Impact Statement contains a rather elaborate analysis of the environmental consequences of the various alternatives proposed. However, in analyzing the regional alternatives, the Draft Statement does not take into account the environmental advantages of eliminating all effluent discharge into Liberty

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and Ne Si Ka Bays. The Environmental Impact Statement notes the importance of Liberty Bay in the production of fisheries income. Given the economic importance of Liberty Bay, the elimination of effluent from Liberty Bay would certainly be an environmental "plus" which should be considered. Likewise, the analysis of the nonregional alternatives for Kitsap County does not take into consideration the environmental disadvantage of continuing effluent discharges in Liberty and Ne Si Ka Bays. 2

We trust that the economic and environmental advantages and disadvantages of regional and nonregional alternatives will be more thoroughly explored in the Final Environmental Impact Statement.

Sincerely yours,

John H. Strasburger

cc: Lemolo Citizens Club, Inc.

JHS:pm

Response to letter from Mr. John M. Strasburger

1. A full evaluation of a regional versus a nonregional alternative is presented in Chapter I.
2. Liberty and Ne-Si-Ka Bays are outside our study area and would be subject to a detailed environmental study for the Poulsbo Facilities Plan. Our analysis shows that there are economic benefits to be realized if Poulsbo joins the regional system. We recognize that discharge of wastewater effluent to a narrow bay is much less preferable than discharge to Port Orchard channel. An EPA-conducted analysis of the effects of waste discharge to Liberty and Ne-Si-Ka Bays by the City of Poulsbo indicates that nutrient levels would increase, causing increased algal production.

October 16, 1975

Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Concerning the Central Kitsap County Wastewater Facilities, Washington, EPA Project C-530494-01, we hereby question some conclusions of the Draft Environmental Impact Statement and object strenuously to the Brownsville (Port Orchard Channel) location (as amended subsequent to the July 24, 1975 Silverdale hearing) as the sewage discharge site.

It is for the following reasons that we question conclusions of the Draft Environmental Impact Statement and of the Brownsville (Port Orchard Channel) location as sewage discharge site:

1) Despite statements in the E.I.S. that relatively good water dispersion will occur in Port Orchard Channel, we are concerned that nutrient levels would increase in the adjacent shallow bays (Liberty, Manzanita, Fletcher) and would cause rapid eutrophication in the summer resulting in extensive algae blooms. Under what basis could a decision be made to discharge effluent in shallow water and adjacent to shallow, well-mixed bays where eutrophication can occur as opposed to discharging in stratified waters beneath the photic zone, as in the central basin of Puget Sound, where eutrophication is unlikely to occur?

2) What will be the effect of human waste on the extensive commercial and sport mollusc populations found in Port Orchard and adjacent bays (such as geoduck and oysters), specifically as regards human coliform bacteria and hepatitis? If the coliform level was high would the state require depuration of these molluscs prior to sale? We do not believe this question was sufficiently addressed in the August E.I.S.

3) There have been less than 4 days of on-site current testing in Port Orchard Channel. Everyone with whom we have spoken (in the U. of W. Department of Oceanography, E.P.A., and the environmental consultants) has agreed that the Puget

Sound model can serve only as a guide and must be accompanied by on-site current testing of duration extensive enough to encompass all tidal ranges and wind conditions. Was this done? Which of the tests were conducted on days with strong northerly winds? If short-term, on-site testing was done on days with strong southerly winds, could those tests be considered indicative of average conditions in the testing area? It would seem mandatory that further, extensive on-site current testing be conducted prior to consideration of Port Orchard Channel as a sewage discharge site.

4) Does the Puget Sound model, which has been the main source of data concerning current movements at the alternative discharge sites, take into account vertical gradients in density (stratification)? To what extent was surface and bottom tension, as well as wind conditions, taken into consideration in the model study results?

5) Incredibly, the almost landlocked Port Orchard Channel was given a much higher rating as an outfall site (relative to water quality) than was the main Puget Sound (east side of Bainbridge Island) (ref. alt. 5, pg. iv-38 and alts. 3&4, pg. iv-37) in the August 1975 E.I.S.? Yet no one to whom we have spoken at the E.P.A., U.R.S., or U.W. Oceanography Dept. has been able to offer any explanation of why this was so. We believe a well documented explanation and/or a re-evaluation is in order.

6) It is inconceivable to us that the effluent could be adequately flushed from behind Bainbridge Island with all the cul-de-sacs of Liberty, Fletcher, and Manzanita Bays, as well as the dead water area of central Port Orchard Channel adjacent to the outfall site. It should also be of great concern that the effluent may increase the likelihood of another "Keyport incident" as has recently occurred in Liberty Bay.

7) To what extent were the herring spawning grounds along the west side of Port Orchard Channel (near the discharge site), the extensive salmon nursery areas existing in Liberty, Fletcher, and Manzanita Bays, as well as the important recreational salmon fishery centered around Battle Point and University Point considered in the rating of Port Orchard Channel as a sewage discharge site? It appears that little consideration was given to these factors. Is it absolutely certain that these natural resources would not be adversely affected by sewage discharge into Port Orchard?

8) As demonstrated by the U. of W. Puget Sound model, a slight movement of the discharge site within the area of Port Orchard, channels effluent into Liberty Bay, Manzanita Bay, the dead water area of Brownsville-University Point, or the beaches on the west side of Port Orchard Channel. The extent of movement to accomplish this was relatively small on the model, not only because of the model's scale, but because of the small tolerances which exist to affect current movement in the actual area, itself. The discharge site, once constructed, will remain static, but the waters of Port Orchard will be continually influx. What reason is there to suppose that over a period of years the currents in Port Orchard will not change to a degree sufficient to alter the flushing movement from the discharge site; instead bringing massive amounts of effluent into one of the adjacent bays or dead water areas?

For these reasons, we strongly urge that the Central Kitsap wastewater discharge site not be located in Port Orchard Channel.

Signed	Occupation	Residence
Arthur Barnett Arthur G. Barnett	Barnett, Robben, Blauert, Pease, Doces & Lewicki Attorneys	Fletcher Bay Bainbridge Island
Thomas Beierle	Schweppe, Doolittle, Krug, Tausend, Beezer & Beierle Attorneys	Fletcher Bay Bainbridge Island
William Klein William Klein	Port Orchard Channel Resident	Fletcher Bay Bainbridge Island
Michael Krieger	Writer, formerly shipping business	Fletcher Bay Bainbridge Island
Vincent Larson	Riddell, Williams, Ivie, Bullitt & Walkinshaw	Fletcher Bay Bainbridge Island

Jon Lindbergh	Marine Biologist, Environmentalist	Manzanita Bay Bainbridge Island
Creed Lombard Creed S. Lombard	Retired Port Orchard ferry pilot and fisherman	Fletcher Bay Bainbridge Island
Conrad Mahnken Conrad Mahnken	Oceanographer	Port Madison Bainbridge Island
George Young George Young	Retired, 40 year Port Orchard Channel resident	Battle Point Bainbridge Island

cc - Senator Warren G. Magnuson
Kitsap County Commissioners
Jack Anderson, Kitsap Public Works Department
URS Company
Bainbridge Review/Kitsap Herald

Response to letter from Bainbridge Island Concerned Citizens

1. The University of Washington field studies indicate that many areas of the Port Orchard system, including the Brownsville area, are very productive. Discharges to the surface waters would, in fact, provide excess nutrients during the spring plankton bloom. Predicted concentrations, from model simulations, indicate a maximum increase in production of eight percent over background values. However, this does not take into account small scales, nor does it allow for the fact that the model does not appear to be representing conditions very well in the Brownsville area.

   An eight percent change would be difficult to measure; moreover, it cannot necessarily be said that this is a harmful change. Algae and other microorganisms provide the major food for many fish and clams, which fact must be balanced against their nuisance value.

2. The treated effluent would be chlorinated and then dechlorinated. This chemical treatment, when combined with an efficient, secondary level treatment facility and high dilution in the receiving water, will reduce coliform organisms to water quality standard levels. If the coliform level were to be high, the State probably would require depuration prior to sale.

3. Wind stress cannot be scaled easily in the physical model and was therefore not included in the study. Field studies were being performed on 7 August 1975, when southerly winds averaged 13.4 mph at Seattle-Tacoma Airport. This was approximately five mph greater than the average.

   A study by the Meteorology Committee of the Pacific Northwest River Basins Commission shows that the probability of hourly observations of wind speeds greater than 12 mph from the south (SE-SW) is five percent during August, the conclusion being that while the magnitude of the wind observed on 7 August 1975 was above average the event itself occurs one hour in 20 during August. The wind may, therefore, be an important mechanism for exchange between Port Orchard and the main part of Puget Sound and for mixing within Port Orchard channel.

4. Vertical density gradients in the model are determined by the amount of fresh water runoff, which is also the principal component in the prototype. Field studies indicate little stratification due to salinity differences in the prototype. Vertical temperature differences, which are not considered in the model, were less than 3.6°F between top and bottom at University Point during mid-summer.

It is worth nothing that the circulation induced by vertical stratification would improve the exchange characteristics of Port Orchard. In this sense, the hydraulic model gives a conservative estimate of the transport.

Surface and bottom stress were considered only in a quantitative way. Caution was used in interpreting results for those areas where the product of water speed, in knots, and depth, in fathoms, is less than 20.

5. New Phase II Study results have been incorporated into a re-evaluation of outfall sites and a discharge into the main Puget Sound now rates higher. An earlier reason for its down rating was the artificially imposed constraint of using a 40 foot water depth in order to have comparable results with other areas. Since that time the facilities planner has assured that the outfall at Point Monroe would extend into deep water.

6. Exchange between the cul-de-sacs of the Port Orchard system and the main Puget Sound does appear to be slow. This is particularly true of Liberty Bay. Parts of the system do respond fairly rapidly, according to field studies performed by the University of Washington. The North Port Orchard site is one of these locations.

   This is verified by the response of silicate, as observed by the University of Washington. Silicate was depleted rapidly during spring phytoplankton bloom (Figures 3-42 and 3-43 of the University of Washington report) in late May-early June, but recovered by the end of June (Figure 3-44).

   The temperature and salinity response observed during the study (Figures 3-5 through 3-10 and Figures 3-11 through 3-16, respectively) also verify this.

7. The North Port Orchard channel, in the vicinity of outfall site C, has been recognized in the EIS and in the Facilities Plan to support herring spawning areas and recreational salmon fishery. The entire Port Orchard channel, particularly in the bays, shallow inlets and sections with tributary streams, has also been recognized as important for its salmon nursery and migration areas. It is estimated that the mixing zone would be a narrow "curtain" 260 feet long and approximately one foot wide at the bottom, increasing to a width of 10 feet below the surface and diffusing over the surface. Fish which contact the effluent near the outfall port could be exposed to a full-strength concentration during the few seconds that they passed through it. Fish which swim closer to the surface would be exposed to an initial dilution of greater than 100:1 an average of 71 percent of the time (EIS supplement, January, 1976, Chapter II). Further flushing and tidal exchange would increase

the effluent dilution. The estimated toxicity levels of major constituents in the effluent from the proposed facility are shown in Appendix F of the Central Kitsap County Facilities Plan. Constituents known to be toxic to fish in full strength concentrations are: (1) aluminum (0.31 mg/l effluent concentration exceeds toxic level of 0.3 mg/l); (2) ammonia (27.0 mg/l effluent level exceeds 1.0 mg/l toxic level); and (3) chlorine (1.0 mg/l effluent level exceeds 0.1 mg/l toxic level). These toxicity levels generally indicate 50 percent survival of test organisms in 96 hours. Chlorine toxicity would be virtually eliminated with planned dechlorination facilities prior to discharge. Minor effects which may cause some fish avoidance in the immediate area are slight drops in the dissolved oxygen levels and small increases in copper concentrations. Fish passing through the narrow outfall plume would experience an instantaneous exposure of a few seconds to a few minutes in the effluent and would probably not be affected by acute toxicity for such a short duration.

Juvenile salmon and other young fishes generally swim close to the shore areas and in shallower waters, where food and shelter are most abundant. The young fish generally avoid the deeper, faster-moving waters and thus would not likely be directly exposed to the areas of the effluent plume with low dilution. Thus, the nearshore waters and bays along Port Orchard Channel would receive effluent diluted in excess of 100:1, and this should not appreciably affect biotic activity and dimension.

No one can say with absolute certainty; at best we can compare with previous experience.

8. The driving forces for the circulation in Port Orchard are tidal forces, wind stress and fresh water runoff. The transport of bottom sediments may very well be important, but the available charts show little change in bottom configuration over the years.

   There is no reason to expect major changes in the tidal forces and wind stress within the next 20 years, but the diversion of fresh water will be a reality. The fresh water runoff is typically 100 to 1,000 times less than the tidal transport; the contribution to the advection processes is therefore negligible. However, the fresh water may be of importance in the density-driven processes such as gravitational convection. The effect upon convection due to diversion of fresh water was not examined.

RECEIVED
MAR 19 1976
EPA-EIS

March 16, 1976

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thiel:

Thank you for sending me the copy of Supplement to the Draft Environmental Impact Statement for Central Kitsap County Wastewater Facilities, EPA Project No. C-530494-01, dated January 1976.

As a resident of Bainbridge Island for 15 years I have been concerned with the planning and environmental efforts to preserve the uniqueness of the Island and to encourage public participation in determining long range policies.

The above document, if implemented, could drastically change the character of the Island. If the major sewer trunk line crosses the northern end of the Island, it could, with the addition of a treatment plant, generate a "Second Winslow". It would have a ten million gallon capacity per day of disposing of treated sewage.

On the enclosed page I have noted the reasons why I am opposed to the disposal of Central Kitsap sewage on and off Bainbridge Island.

Very truly yours,

George A. Hartman, A. I. A.
Affiliate A. I. P.

Copies:
Senator Warren G. Magnuson
Robert Mitchell
BIPAC
Mr. Frank Randall
Mr. Stuart A. Robertson, F.S.A.

GEORGE A HARTMAN RT 7 BOX 7600 BAINBRIDGE ISLAND WASHINGTON 98110

Following is a summary of the comments to the draft EIS:

1. Agency that is NOT responsible for Comprehensive Planning on Bainbridge Island is in fact doing the comprehensive planning

2. A potential URBAN CENTER will develop along the sewer line, because sewer districts are legally constrained to provide future connections by "Equity of Service".

3. Such an Urban Center is CONTRARY to the present Comprehensive Plan, where the interior of the Island is zoned for a minimum 30,000 square foot lots.

4. Out of ten alternate sites that are being evaluated, six are off Bainbridge Island, rated first, second, third, fourth, fifth and seventh. Yey dddddf the land on Bainbridge, or the location of the outfalls, were NOT part of the STUDY AREA.

5. People on Bainbridge Island are not aware of the long range impact of the proposed pipeline. The plan is being implemented without due process of law.

6. There are at least two other studies being conducted, yet there does not appear to be any coordination and any assessment of total cumulative impact on the Puget Sound Waters

7. The conclusions ON the ten sites are questionable, because acording to the draft EIS statement: "All the models of dilution and dispersion share a common drawback ; their accuracy is predicated upon an extremely limited amount of actual field current measument."

8. From the practical point of view, further quote from the draft EIS: "Thus, based on the information available, the extra cost of a Point Monroe discharge probably cannot be justified on the grounds of superior dispersion."

9. In determining the weighted ratings for each site, the draft EIS does not satisfactorily explain how the ratings were established. These ratings are a vital tool in ultimate site selection.

Response to letter from Mr. George A. Hartman

1. This statement is untrue. No comprehensive planning is being done for Bainbridge Island. Bainbridge Island's only involvement with the Central Kitsap County Facilities Plan is as a location for a treated effluent outfall. This is quite reasonable since Bainbridge Island is a part of Kitsap County. The alternative projects involving Bainbridge Island would not mandate any changes in the island's comprehensive planning.

2. and 3. The treated effluent transmission lines considered for Bainbridge Island are not "sewer" lines. Raw sewage cannot be added to those lines, and thus there is no incentive for any raw sewage-producing establishment to locate near the lines. Development on Bainbridge Island would be dictated by the island's comprehensive plan and the locations of the island's sewage treatment facilities and service zones.

4. The outfall location off Bainbridge Island was subjected to a biological survey, and the proposed pipeline route was also evaluated by our ecologists. The preferred alternative will not even involve Bainbridge Island to this degree.

5. The people of Bainbridge Island have been notified of the Facilities Plan and their comments solicited, as evidenced by your letter and others presented in this chapter.

6. Total cumulative impact upon Puget Sound waters is beyond the scope of the environmental impact assessment for this project, but the effects of this plan are expected to be negligible. One must also face the realities that with the exception of land disposal, which was investigated and found infeasible, any remaining discharge alternative will ultimately end up in Puget Sound.

7. For this reason, treatment plant and outfall designs are conservative as a standard procedure, allowing reasonable safety factors. Also, although field verification of modeling results has been limited, the results are sufficiently accurate for site selection.

8. The quote is presented out of context. Point Monroe should provide better dilution and dispersion but not sufficiently so to justify the added cost of that alternative. This is why a discharge to Port Orchard channel, where impacts are expected to be negligible, was selected as preferred.

9. Appendix A provides a detailed explanation of the rating system and the combination of expert opinion with local citizens' concerns.

Silverdale, Wash.
November 2 1975

Richard R. Thiel, Chief,
E.I.S. m/s 443
E.P. Agency
Seattle, Wash.

RECEIVED
NOV 04 1975

Dear Sir,

Please accept this as an objection to the Trident Sewer line going down through Clear Creek Valley As one of the prettiest farm valleys of the county this would interfer with this agricultural zoned land and would greatly interrupt the farming due to the fencing, pasture land, drainage tiled ditches, established hay fields and also harm the spawning areas of Clear Creek.

As a land owner - 77 acres - and with the line going through our farm land we would ask you to reconsider plan #11 out Luoto Road to Keyport area.

For National Defense we appreciate Trident at Bangor - my folks' original home and farm in 1915 - and appreciate your time and consideration of keeping our valley for the population to enjoy and our own contentment.

Thanking you,

Sincerely,
Alton Driddis
Rt. 1 Box 224
Silverdale, Wn. 98383

Silverdale, Wash.
November 5, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Wash. 98101

Dear Sir:

After attending the October 29th meeting on the Central Kitsap County Wastewater Facilities, I became quite disturbed over the fact that all ten plans involved coming through the Clear Creek Valley. However, I was somewhat relieved at the end of the meeting to learn that some work and study has been made on an eleventh alternative.

For the past 32 years I have owned and lived on 40 acres that straddle Clear Creek. I further intend to live here for the rest of my life, and have no thoughts of selling off any portion to developers or speculators.

At the present time Clear Creek Valley is zoned Agricultural, which is the way I would prefer to have it remain. This is also the attitude that I find among my neighbors who live here for pretty much the same reason that I do, namely that we like the rural atmosphere. A sewer through the Valley poses a real threat to the zoning and the rural atmosphere, and I am very much against the ten present alternatives. The population density here in the Valley certainly does not call for a sewer line, and septic tanks seem to be adequately taking care of our wastewater.

At this time I would very strongly urge that you pursue Alternative #11, which when considered with the sewer problems of Poulsbo and Lemolo makes far and away the most sense of any plans. From news releases it appears that the Luoto Road will be ripped up and be made 4 lanes, which further adds logic to incorporating the sewer line on that route at this time.

I certainly appreciate all the work that has been done in preparing the 10 alternatives. However, I respectfully request that you pursue Alternative #11 with the same depth and vigor.

Sincerely yours,

Eric D. Kegley

Cc Mr. Gene Lobe
Mr. Frank Randall
Mr. Bill Mahan

Eric D Kegley
Route 1, Bx 178
Silverdale, Va. 98383

RECEIVED
NOV 10 1975

Route 1 Box 225
Silverdale, WA 98383
November 6, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Dear Mr. Thiel,

In the last few days we have learned that the Central Kitsap Waste Water meeting held on October 29 discussed 10 alternative plans for bringing waste water from the Trident Base. It seems that all of these plans were routed down the Mountain View Road and then down Clear Creek Valley to Silverdale.

We still own 20 acres of land that has been in our family since 1920 and had hoped to see it remain as a farm for the rest of our lives and then to pass it on to our children. At the present time Clear Creek Valley and out to where this farm is located is zoned agricultural, and we are deeply concerned that with the coming of a sewer there would be great pressure from developers and speculators to rezone, bringing unbearable taxes and other problems connected with high density population.

It is our understanding that in addition to the 10 alternatives presently included in the Environmental Impact Statement that some work has already been done on Alternative #11, which is an entirely different routing from the other 10 alternatives. It is also our understanding that Alternative #11 would be routed over the Luoto road, picking up interceptor lines from Poulsbo and Lemolo, thence on to Keyport and the treatment plant in the Brownsville area. It would seem that this would be a much more logical and efficient routing than the 10 other alternatives. We would certainly urge that you further study and pursue this route.

Respectfully yours,

Edward Vig
Arlene M. Vig

Copies to Mr. Gene Lobe
Mr. Frank Randall
Mr. Bill Mahan

RECEIVED

Nov. 8, 1975

Dear Mr. Thiel

We have owned property in this valley for 23 years, also a business established in 1935. We have a total of 50 acres crossing the valley from Clear Creek to Shold Road.

We are satisfied with the agricultural zoning and trust it will be maintained.

We disagree with the proposal which would run the sewer through the middle of Clear Creek Valley.

We are aware of alternate II and urge your consideration of this route.

Thank You

Mr. & Mrs. Don Schoner
Rt 1 Box 187
Silverdale, Wash
98383

RECEIVED
NOV 11 1975
EPA-EIS

Nov. 10, 1975
Silverdale, Wn.

Dear Sir,

We are writing in protest of the 10 plans that have been adopted for the sewer lines in the Clear Creek Valley area.

We are property owners with property ajoining the Valley, and don't want to see this area opened up to developers etc which will be an aftermath of these plans.

We are very much in favor of plan #11 which would go out Luoto Rd. & house Poulsbo & other areas that are very much in need of sewer lines. This plan (#11) is the best & most favorable in our eyes, & we would like to see it go thru.

Thank you,

Mrs Lawrence M. Gerland
Rt 1, Box 229-A
Silverdale, Wn. 98383

RECEIVED
NOV 11 1975
EPA-EIS

MOUNTAIN VIEW [illegible]
[illegible] & GLOR[illegible]
Rt. 1, Box 235 — [illegible]
SILV[illegible], WASH. [illegible]

Dear Mr. Thiel,

I am writing concerning the proposed sewar line plans for the Trident-Bangor area. We strongly oppose any plan that runs the sewar line up Mountain View Road, and then cutting across through the Clear Creek Valley. The availability of sewars to the developers in our area would encourage smaller lot sizes, and thus more people per acre, leading to a loss of our "rural and agricultural" area. The land on our hill should be very capable of perking for septic systems, so we see no reason to have these sewar lines intercept our area.

We strongly suggest that you go with alternative #11 that runs the sewar line down Luoto Road to Keyport, perhaps even picking up some of the wastes in the near by Poulsbo and Lemolo.

My Husband and I own and operate the only Grade "A" Raw Milk Dairy in Kitsap County. We are located on Mountain View Road. Encouraging the housing developers in our area with this sewar line will hep push the last of the farmers out of an area zoned "Agricultural."

Respectfully,

Gloria E. Edwards

MOUNTAIN VIEW [illegible]
DAVID & GLORIA EDWARDS
Rt 1, Box 2[illegible] – [illegible]
[illegible] Washington [illegible]

RECEIVED
NOV 1[illegible] 1975
EPA-EIS

Silverdale, Wa.
November 7, 1975

Mr. Richard R. Thiel, Chief
Environmental Impact Section, M/S 443
Environmental Protection Agency
1200 6th Ave.
Seattle, Wa. 98101

Dear Mr. Thiel:

During the October 29 meeting on the Central Kitsap Wastewater Facilities we couldn't help but be impressed with the vast amount of leg work and research necessary to bring the project to its present state.

Since the July 24 meeting when it was announced the sewer routes would all come down Clear Creek Valley it has been a subject of great concern to those of us who have lived here for many years, as well as those who have moved in with the thought of living in an area zoned agricultural. We have been here for over 27 years and know quite well most of the people in the valley, and in all candor we must say that as of now we are unable to find one person who really approves of a big sewer line through Clear Creek Valley. The worst objections are that this will speed development and speculation, bringing about increased taxes and other problems, crime, etc.

After the July 24 meeting a few of us discussed the over-all sewer problem in Kitsap County, and made the suggestion that Silverdale, Trident, Poulsbo and Lemolo would all be handled together with an outfall in the Brownsville area, which seems to be the most acceptable from the standpoint of cost and feasibility. At the close of the October 29 meeting we were pleased to see that our suggestion had been pursued and that considerable work has already been done on Alternative #11, with a promise in Mr. Fusco's letter of October 23 that the project would be pursued more fully.

Since the Poulsbo and Lemolo sewer problems are quite acute, and since the Luoto Road is to be torn up and four-laned, it would seem very timely that the sewer line be incorporated in that project at this time. This also has the added advantage of serving a much greater number of people than coming down through Clear Creek Valley. Furthermore, no easements would be involved on this line.

By far the largest share of the land in the Valley is owned by farm people such as myself, who intend to farm and have no intention of selling out to developers and see no need for a sewer line at this time. As for the future, the uplands on the sides of the Valley are very suitable for septic tanks, particularly if zoning regulations and lot sizes are made adequate.

The more we think about the project the more good things we can see in favor of Alternative #11, and we strongly suggest that this route be very carefully considered.

RECEIVED
NOV 11 1975
EPA EIS

Respectfully yours,

Gerald Petersen

Dorothy S Petersen

GP:dp
Cc: Messrs. Lobe, Randall and Mahan,
County Commissioners

Gerald Petersen
Rt 1, Bx 193, Silverdale, Wa. 98383

Nov 8 1975
Mr Richard R. Thief, Chief
Environmental
Protection Agency
Seattle, Wash.

Dear Mr Thief

I am writing to protest Bangor's sewerage lines being laid across the Clear Creek Valley for the following reasons;

1. The neighboring families would like to keep the valley they green belt that it is not rezoned to Residential.

2. Housing projects & Bangor Base should pay for proper sewerage treatment and have proper water supply.

3. If trunk lines are laid across private property, fences have to be torn down, ditches have to be dug to cover the pipes, plus taxes will be higher.

4. People here in the valley prefer rural living and it costs money to move and to sell out.

5. Taxes are high enough, if trunk lines or connecting lines are laid to main, percentages will raise in the valley and then most of us here will be rezoned off our property.

In short my family's been here 90 years and we like the valley left in its present state

We need to Keep some land or green belte in Kitsap County - so the ones who live in town or housing projects can breath some fresh air.

6. Clear Creek is the second largest spawning creek for salmon.

There are a lot of houses for sale in Bremerton and other areas to expand to. Not everyone can live right outside the Bangor main gate. Clear Creek Valley lays right below the Main gate to Bangor. The people here have roots and would like to stay in the valley the home to our folks.

Yours truly,
Loyanne M. Anderson
Rt 1, Box 207
Silverdale Wash.
98383

RECEIVED
NOV 1_ 1975
EPA

Response to comments from Messrs. Priddis, Kegley, and Peterson, Mrs. Laurence Copeland, Mr. and Mrs. Edward Vig, Mr. and Mrs. Don Schoner, Mr. and Mrs. David Edwards and Mrs. Lorraine Anderson.

Your concerns are satisfied; the proposed project does not include an interceptor down Clear Creek.

APPENDIX A

ALTERNATIVE EVALUATION COMPUTER SUMMARY

A-1 Methodology
A-2 Typical Individual Output
A-3 Summary Output

Appendix A-1

METHODOLOGY

NUMERICAL EVALUATION METHODOLOGY AND RESULTS

The Environmental Impact Report format used herein is based on the Socio-Economic Systems, Inc. EVAL Methodology. The EVAL system is characterized by four primary procedural steps:

1. The environmental impacts to be evaluated are classified according to environmental impact categories and numerous sub-categories. The four basic categories are:

   a. Physical Impacts: Those aspects of the proposed project which physically degrade or enhance the environment: e.g., air pollution, noise, changes to physical and biological systems, etc.

   b. Resource Impacts: Those aspects of the proposed project which demand or supply services and/or resources: e.g., power demands, municipal service demands, transportation demands, etc.

   c. Economic Impacts: Those aspects of the proposed project which affect the economic conditions in the relevant area: e.g., employment, tax base, etc.

   d. Socio-Cultural Impacts: Those aspects of the project which affect the social, cultural and aesthetic conditions in the relevant areas: e.g. architectural features, maintenance of historical sites in the area, health and safety, etc. The environmental impact categories, criteria and sub-criteria used in this study are shown on the following page.

2. Once the impact categories are defined, they are assigned a value according to their relative significance. For instance, the Physical Impacts of the project may be more significant than Socio-Cultural Impacts, so the former would be given a rating factor of 100%, the latter a rating factor of 80%. The relative importance of sub-categories are similarly determined, and weighting factors are assigned.

3. Numerical ratings are given for each individual criterion. Generally, a "0" rating indicates no impact. A positive number indicates a beneficial impact, and a negative number indicates an adverse impact. The range of ratings is +100 to -100, with "significant" adverse impacts being identified by a ranking of -10 or lower. It is important to note the comparative, rather than absolute nature of these ratings; that is, a rating of -10 for a particular alternative's impact upon air quality fundamentally means the alternative ranks better in comparison to an alternative which is rated -20 according to this criterion.

4. The numerical ratings are multiplied by the appropriate weighting factors, and the resultant weighted impact ratings are summed up for each alternative to give a composite rating for each of the alternatives, including the "no project" alternative.

A graphical display of the comparative impacts of the alternatives is given to provide a summary comparison of the alternatives. Detailed information on the individual rated criteria is provided on a separate page for each criterion. Each of these pages lists:

1. Criterion title
2. Criterion definition
3. Boundary of the affected area
4. Method of analysis
5. Discussion of synthesis of pertinent information
6. The source or reference from which the data came and with whom the data was verified.

The summarized, composite values are designed to provide at-a-glance comparison of alternatives. The detailed criteria analyses are designed to provide explicit and clear explanations of each environmental impact evaluation. This allows the interested reader to see exactly how the evaluation process was carried out. The numerical ratings precisely communicate the comparative impacts of the alternatives on the particular environmental factor. With this information the reader is able to decide whether or not he agrees with the impact assessment. In determining the set of weighting factors used to denote cumulative impact of the proposed project, various officials were contacted in order to ascertain which criteria groups were the most critical in terms of the long-range goals of Kitsap County.

Two sets of weighting factors are presented: one derived from a public opinion survey conducted by URS and the other developed in a meeting held in June, 1975. Present at this meeting were members of the Kitsap County Planning Department, the County Engineer, and others.

The public opinion survey results were analyzed to obtain the weighting factors by separating the sampling matrix into the four categories of physical, resources, economic, and socio-cultural impacts (see following table). The value number was then divided by the number of items to give the mean value. For physical impacts, this value was likewise multiplied by 27.63 to equal 100%. The other mean values were likewise multiplied by 27.63 to obtain their relative weights.

Environmental Impact Criteria

- PHYSICAL IMPACTS
  - Environmental Qualities
  - Air Quality
  - External Noise
  - Odor
  - Terrestrial Environment
    - Wildlife & Its Habitats
    - Vegetative Communities
  - Marine Biological Environment
    - Benthic
    - Water Column
    - Surface
  - Water Quality
    - Surface Water
    - Marine Water
  - Groundwater Quantity
  - Groundwater Quality
  - Soils (Fertility)

- ECONOMIC IMPACTS
  - Direct Effects
    - Municipal Services Cost
    - Loans and Subsidies
    - Property Tax
    - Changes in Tax Revenues
    - Changes in Tax Rates
  - Indirect Effects
    - Property Values

- RESOURCE IMPACTS
  - Utility Service Systems
    - Electrical
    - Water
  - Municipal Services
    - Environmental Health
    - Parks and Recreation
    - Sanitary
  - Natural Res[illegible]
    - Potable [illegible]und Water
      - Quali[illegible]
      - Quanity
    - Potable Sur[illegible] Water
    - Fauna
      - Marine
      - Terrestrial

- SOCIO-CULTURAL IMPACTS
  - Social Impacts
    - Planned Land Use Pattern
    - Health and Safety
  - Cultural/Esthetic Impacts
    - Archeological and Historical
    - Entertainment and Recreation
    - External Esthetic Impression

Impact	No. of Items	Total Value	Mean	Weight
Physical	21	76	3.6	100
Resource	8	16	2.0	55
Economic	9	9	1.0	28
Socio-Cultural	11	30	2.7	75

The sub-categories were not weighted for the public opinion survey. It was felt that the sub-category items received equal weight.

The weighting factors assigned at the June, 1975 meeting were as follows:

	Category Weight	Sub-Category Weight
Physical Impacts	100	
Environmental Qualities		100
Terrestrial Environment		90
Alteration of Biological Environment		95
Resource Impacts	90	
Utilities Service System		100*
Municipal Service		100*
Natural Resources		100*
Economic Impacts	95	
Direct Impacts		100
Indirect Impacts		95
Socio-Cultural Impacts	85	
Social Impacts		100
Cultural and Aesthetic Impacts		90

*Considered equal

In summary, the EVAL methodology makes it possible to compare the total impact of proposed project alternatives by quantitative evaluation, emphasizing during the process the more important criteria, and therefore, the most critical environmental impacts. The individual impact evaluations which led to the final comparison are clearly delineated, allowing the reviewer the opportunity to determine whether he agrees with the evaluation, if not, precisely where the disagreement lies.

APPENDIX A-2

TYPICAL INDIVIDUAL OUTPUT

The following section contains a computer output of the basic information developed for alternative plan No. 11. It is typical of the output format for any alternative plan.

```
         ******************************************
         *                E.I.R.S.                *
         *  ENVIRONMENTAL IMPACT REVIEW SERVICE   *
         *  FOR: KITSAP WASTEWATER TREATMENT(11)  *
         ******************************************
DATE: 12/31/75                                  PAGE:  4  (18070)
CODE: 75-2 REV                             CLIENT REF: EPA-10

              ENVIRONMENTAL IMPACTS: ANALYSIS FRAMEWORK

THE SOCIO-ECONOMIC SYSTEMS, INC., ENVIRONMENTAL IMPACT ANALYSIS
METHODOLOGY CLASSIFIES IMPACTS IN FOUR CATEGORIES:

   1. PHYSICAL IMPACTS: THE EXTENT TO WHICH THE PROPOSED PROJECT
      PHYSICALLY ENHANCES OR DEGRADES THE ENVIRONMENT IN AREAS SUCH
      AS AIR QUALITY, NOISE, FAUNA AND FLORA,HYDROLOGY, TRAFFFIC, ETC.
      (THIS PROJECT HAS  4 SUBCATEGORIES CONTAINING 10 TOTAL INDIVIDUAL
      CRITERIA)


   2. RESOURCE IMPACTS: THOSE ASPECTS OF THE PROPOSED PROJECT WHICH
      DEMAND OR SUPPLY SERVICES AND/OR RESOURCES, E.G. UTILITIES
      DEMANDS, MUNICPAL SERVICE DEMANDS, TRANSPORTATION DEMANDS.
      (THIS PROJECT HAS  3 SUBCATEGORIES CONTAINING  9 TOTAL INDIVIDUAL
      CRITERIA)


   3. ECONOMIC IMPACTS: THOSE ASPECTS OF THE PROPOSED PROJECT WHICH
      AFFECT ECONOMIC CONDITIONS IN THE RELEVANT AREA, E.G. TAX BASE,
      EMPLOYMENT, NEW BUSINESS FORMATION, ETC.
      (THIS PROJECT HAS  2 SUBCATEGORIES CONTAINING  4 TOTAL INDIVIDUAL
      CRITERIA)


   4. SOCIO-CULTURAL IMPACTS: THOSE ASPECTS OF THE PROPOSED PROJECT
      WHICH AFFECT SOCIAL, CULTURAL AND AESTHETIC CONDITIONS IN  THE
      RELEVANT AREA, E.G. LAND USE COMPATABILITY, POPULATION SIZE
      AND DENSITY, HISTORICAL OR ARCHEEOLOGICAL SITES, ARCHITECTURAL
      FEATURES, ETC.
      (THIS PROJECT HAS  2 SUBCATEGORIES CONTAINING  5 TOTAL INDIVIDUAL
      CRITERIA)


THESE FOUR CATEGORIES ARE BROKEN DOWN INTO THE INDICATED NUMBER OF
SUBCATEGORIES AND CRITERIA, SOME WITH SUB-CRITERIA, WHICH ARE ANALYZED
SEPARATELY.  THE RESULTS OF THE ANALYSIS OF PROJECT IMPACTS ARE SUMMA-
RIZED IN THE SECTION TITLED "ENVIRONMENTAL IMPACT SUMMARY SCORES",
DISPLAYED GRAPHICALLY IN "GRAPHIC DISPLAY: PROJECT ENVIRONMENTAL
IMPACTS" AND "PROJECT ALTERNATIVES BAR GRAPH", AND DESCRIBED IN DETAIL
IN "ENVIRONMENTAL IMPACTS INDEX OF CRITIERIA".
```

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```
              ******************************************
              *               E.I.R.S.                 *
              *  ENVIRONMENTAL IMPACT REVIEW SERVICE   *
              *  FOR: KITSAP WASTEWATER TREATMENT(11)  *
              ******************************************
DATE: 04/01/76                                        PAGE:  8  (18070)
CODE: 75-2 REV                                    CLIENT REF: EPA-10

                ENVIRONMENTAL IMPACT INDEX OF CRITERIA

KEY TO INDEX OF CRITERIA:

 ITEM: PARTICULAR IMPACT ITEMS  ANALYZED IN THIS REVIEW.

 PAGE(S): LOCATION OF RELEVANT DATA IN EIR UNDER REVIEW

 KEY ITEM: ASTERISKS (***) CALL ATTENTION TO ITEMS WITH RATINGS
           GREATER THAN +10 OR -10 ON A SCALE OF -100 TO +100.
           "UNR" INDICATES AN UNRATABLE ITEM. EIR CONTAINED INSUFFI-
           CIENT DATA ON WHICH TO BASE A NUMERICAL RATING.

 STATUS: M (MANDATORY) OR D (DESIRABLE) INDICATE THE IMPORTANCE OF THE
         PARTICULAR IMPACT ITEM IN THE ANLYSIS OF OVERALL PROJECT
         IMPACTS.

 WEIGHT: RELATIVE IMPORTANCE OF PARTICULAR ITEM RELATIVE TO OTHER ITEMS
         WITHIN THE SAME CATEGORY, SUB-CATEGORY, OR CRITERION.
         C (CATEGORY), SC (SUB-CATEGORY), CR (CRITERION), SX (SUB-
         CRITERION) INDICATE LEVEL OF ITEM BEING WEIGHTED.

 BASE RATING: UNWEIGHTED NUMERICAL RATING OF IMPACT ON A SCALE OF -100
         TO +100 ASSIGNED TO PARTICULAR ITEM.

 RATING SENSITIVITY: THE CHANGE IN THE OVERALL PROJECT RATING
   THAT WOULD RESULT IF THIS INDIVIDUAL BASE ITEM WERE RAISED OR
   LOWERED BY 10 POINTS.
   ACTUAL OVERALL PROJECT RATING IS  12.73.

   IMPACT OF PARTICULAR ITEM FOR NO-PROJECT AND OTHER ALTERNATIVES
   CONSIDERED.  RATED AT CATEGORY AND SUB-CATEGORY LEVELS ONLY.  FIRST
   NUMBER IS NO-PROJECT ALTERNATIVE, ALTERNATIVE #1 DIRECTLY BELOW
   NO-PROJECT AND ALTERNATIVE #2 BELOW #1.


                                   :      :     :         :       :RATING:RATNG
    ITEM ID #  PAGE(S)             :KEY   :STA-:          : BASE  :SENSI-:ALTER
    IMPACT ITEM NAME               :ITEM  :TUS :WEIGHT    :RATING:TIVITY:NTVES
 ----------------------------------:------:----:----------:------:------:-----
                                   :      :    :          :      :      :
1000  PP.                          :      :    :          :      :      :
PHYSICAL IMPACTS                   :      : M  : C 100%   :  7.94:  3.88: 0.00
                                   :      :    :          :      :      :
  1100  PP.                        :      :    :          :      :      :
  ENVIRONMENTAL QUALITIES          :      : M  :SC 100%   : -1.67:  0.97: 0.00
                                   :      :    :          :      :      :
```

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```
          ***************************************
          *              E.I.R.S.               *
          *  ENVIRONMENTAL IMPACT REVIEW SERVICE *
          *  FOR: KITSAP WASTEWATER TREATMENT(11) *
          ***************************************
DATE: 04/01/76                                   PAGE:  9  (18070)
CODE: 75-2 REV                             CLIENT REF: EPA-10

                              :     :     :       :       :RATING:RATNG
    ITEM ID #  PAGE(S)        :KEY  :STA- :       : BASE  :SENSI-:ALTER
    IMPACT ITEM NAME          :ITEM :TUS  :WEIGHT :RATING:TIVITY:NTVES
------------------------------:-----:-----:-------:-------:------:-----
                              :     :     :       :       :      :
   1110  PP.                  :     :     :       :       :      :
   AIR QUALITY                :     : M   :CR 100%:  0.00:  0.32:
                              :     :     :       :       :      :
   1120  PP.                  :     :     :       :       :      :
   EXTERNAL NOISE             :     : M   :CR 100%: -5.00:  0.32:
                              :     :     :       :       :      :
   1140  PP.                  :     :     :       :       :      :
   ODOR                       :     : M   :CR 100%:  0.00:  0.32:
                              :     :     :       :       :      :
 1200  PP.                    :     :     :       :       :      :
 TERRESTRIAL ENVIRONMENT      :     : M   :SC 100%: -0.08:  0.97: 0.00
                              :     :     :       :       :      :
   1210  PP.                  :     :     :       :       :      :
   WILDLIFE & ITS HABITATS    : *** : M   :CR 100%:-15.00:  0.24:
                              :     :     :       :       :      :
   1220  PP.                  :     :     :       :       :      :
   FRESHWATER ECOLOGY         :     : M   :CR 100%:  5.00:  0.24:
                              :     :     :       :       :      :
   1230  PP.                  :     :     :       :       :      :
   VEGETATIVE COMMUNITIES     : *** : M   :CR 100%:-12.00:  0.24:
                              :     :     :       :       :      :
   1270  PP.                  :     :     :       :       :      :
   MARINE BIOL. ENVIRONMENT   : *** : M   :CR 100%: 21.67:  0.24:
                              :     :     :       :       :      :
     1271  PP.                :     :     :       :       :      :
     BENTHIC                  : *** : M   :SX 100%: 25.00:  0.08:
                              :     :     :       :       :      :
     1272  PP.                :     :     :       :       :      :
     WATER COLUMN             : *** : M   :SX 100%: 20.00:  0.08:
                              :     :     :       :       :      :
     1273  PP.                :     :     :       :       :      :
     SURFACE                  : *** : M   :SX 100%: 20.00:  0.08:
                              :     :     :       :       :      :
 1500  PP.                    :     :     :       :       :      :
 WATER QUALITY                : *** : M   :SC 100%: 33.50:  0.97: 0.00
                              :     :     :       :       :      :
   1510  PP.                  :     :     :       :       :      :
   SURFACE WATER              : *** : M   :CR 100%: 38.00:  0.32:
                              :     :     :       :       :      :
   1520  PP.                  :     :     :       :       :      :
   MARINE WATER               : *** : M   :CR 100%: 50.00:  0.32:
                              :     :     :       :       :      :
   1530  PP.                  :     :     :       :       :      :
   GROUNDWATER                : *** : M   :CR 100%: 12.50:  0.32:
                              :     :     :       :       :      :
```

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```
            ****************************************
            *              E.I.R.S.                *
            *  ENVIRONMENTAL IMPACT REVIEW SERVICE *
            *  FOR: KITSAP WASTEWATER TREATMENT(11) *
            ****************************************
DATE: 04/01/76                                          PAGE: 10  (18070)
CODE: 75-2 REV                                    CLIENT REF: EPA-10

                                   :     :    :       :      :RATING:RATNG
     ITEM ID #  PAGE(S)            :KEY  :STA-:       : BASE :SENSI-:ALTER
     IMPACT ITEM NAME              :ITEM :TUS :WEIGHT :RATING:TIVITY:NTVES
-----------------------------------:-----:----:-------:------:------:-----
                                   :     :    :       :      :      :
        1531  PP.                  :     :    :       :      :      :
        GROUNDWATER QUANTITY       : *** : M  :SX 100%:-25.00:  0.16:
                                   :     :    :       :      :      :
        1532  PP.                  :     :    :       :      :      :
        GROUNDWATER QUALITY        : *** : M  :SX 100%: 50.00:  0.16:
                                   :     :    :       :      :      :
     1600  PP.                     :     :    :       :      :      :
     SOILS (FERTILITY)             :     : M  :SC 100%:  0.00:  0.97: 0.00
                                   :     :    :       :      :      :
  2000  PP.                        :     :    :       :      :      :
  RESOURCE IMPACTS                 : *** : M  : C  55%: 10.46:  2.13: 0.00
                                   :     :    :       :      :      :
     2100  PP.                     :     :    :       :      :      :
     UTILITY SERVICE SYSTEMS       :     : M  :SC 100%: -0.50:  0.71: 0.00
                                   :     :    :       :      :      :
       2120  PP.                   :     :    :       :      :      :
       ELECTRICAL                  :     : M  :CR 100%: -1.00:  0.36:
                                   :     :    :       :      :      :
       2170  PP.                   :     :    :       :      :      :
       WATER                       :     : M  :CR 100%:  0.00:  0.36:
                                   :     :    :       :      :      :
     2200  PP.                     :     :    :       :      :      :
     MUNICIPAL SERVICES (I)        : *** : M  :SC 100%: 25.00:  0.71: 0.00
                                   :     :    :       :      :      :
       2220  PP.                   :     :    :       :      :      :
       ENVIRONMENTAL HEALTH        : *** : M  :CR 100%: 25.00:  0.24:
                                   :     :    :       :      :      :
       2250  PP.                   :     :    :       :      :      :
       PARKS AND RECREATION        :     : M  :CR 100%:  0.00:  0.24:
                                   :     :    :       :      :      :
       2370  PP.                   :     :    :       :      :      :
       SANITARY SEWER SYSTEM       : *** : M  :CR 100%: 50.00:  0.24:
                                   :     :    :       :      :      :
     2400  PP.                     :     :    :       :      :      :
     NATURAL RESOURCES             :     : M  :SC 100%:  6.88:  0.71: 0.00
                                   :     :    :       :      :      :
       2410  PP.                   :     :    :       :      :      :
       POTABLE UNDERGRND WATER     : *** : M  :CR 100%: 12.50:  0.18:
                                   :     :    :       :      :      :
         2411  PP.                 :     :    :       :      :      :
         QUALITY                   : *** : M  :SX 100%: 50.00:  0.09:
                                   :     :    :       :      :      :
         2412  PP.                 :     :    :       :      :      :
         QUANTITY                  : *** : M  :SX 100%:-25.00:  0.09:
                                   :     :    :       :      :      :
```

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```
**************************************************
*                  E.I.R.S.                      *
*    ENVIRONMENTAL IMPACT REVIEW SERVICE         *
*    FOR: KITSAP WASTEWATER TREATMENT(11)        *
**************************************************
DATE: 04/01/76                                PAGE: 11  (18070)
CODE: 75-2 REV                           CLIENT REF: EPA-10

                                :     :     :      :       :RATING:RATNG
   ITEM ID #  PAGE(S)           :KEY  :STA- :      : BASE  :SENSI-:ALTER
   IMPACT ITEM NAME             :ITEM :TUS  :WEIGHT:RATING:TIVITY:NTVES
--------------------------------:-----:-----:------:------:------:-----
                                :     :     :      :       :      :
     2420  PP.                  :     :     :      :       :      :
     POTABLE SURFACE WATER      :     : M   :CR 100%:  5.00:  0.18:
                                :     :     :      :       :      :
     2450  PP.                  :     :     :      :       :      :
     FAUNA                      :     : M   :CR 100%: 10.00:  0.18:
                                :     :     :      :       :      :
       2451  PP.                :     :     :      :       :      :
       TERRESTRIAL              :     : M   :SX 100%:  0.00:  0.09:
                                :     :     :      :       :      :
       2452  PP.                :     :     :      :       :      :
       MARINE                   : *** : M   :SX 100%: 20.00:  0.09:
                                :     :     :      :       :      :
     2460  PP.                  :     :     :      :       :      :
     FLORA - CROPS/COMMERCIAL   :     : M   :CR 100%:  0.00:  0.18:
                                :     :     :      :       :      :
 3000  PP.                      :     :     :      :       :      :
 ECONOMIC IMPACTS               : *** : M   : C  28%: 20.42:  1.09: 0.00
                                :     :     :      :       :      :
    3100  PP.                   :     :     :      :       :      :
    DIRECT EFFECTS              : *** : M   :SC 100%: 30.83:  0.54: 0.00
                                :     :     :      :       :      :
      3120  PP.                 :     :     :      :       :      :
      MUNICIPAL SERVICES COSTS  :     : M   :CR 100%:  0.00:  0.18:
                                :     :     :      :       :      :
      3130  PP.                 :     :     :      :       :      :
      LOANS AND SUBSIDIES       : *** : M   :CR 100%: 90.00:  0.18:
                                :     :     :      :       :      :
      3140  PP.                 :     :     :      :       :      :
      PROPERTY TAX              :     : M   :CR 100%:  2.50:  0.18:
                                :     :     :      :       :      :
        3141  PP.               :     :     :      :       :      :
        CHANGES IN TAX REVENUES :     : M   :SX 100%:  5.00:  0.09:
                                :     :     :      :       :      :
        3142  PP.               :     :     :      :       :      :
        CHANGES IN TAX RATES    :     : M   :SX 100%:  0.00:  0.09:
                                :     :     :      :       :      :
    3200  PP.                   :     :     :      :       :      :
    INDIRECT EFFECTS            :     : M   :SC 100%: 10.00:  0.54: 0.00
                                :     :     :      :       :      :
      3210  PP.                 :     :     :      :       :      :
      PROPERTY VALUES           :     : M   :CR 100%: 10.00:  0.54:
                                :     :     :      :       :      :
 4000  PP.                      :     :     :      :       :      :
 SOCIO-CULTURAL IMPACTS         : *** : M   : C  75%: 17.92:  2.91: 0.00
                                :     :     :      :       :      :
```

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```
                  *****************************************
                  *              E.I.R.S.                 *
                  *  ENVIRONMENTAL IMPACT REVIEW SERVICE  *
                  *  FOR: KITSAP WASTEWATER TREATMENT(11) *
                  *****************************************
DATE: 04/01/76                                      PAGE: 12  (18070)
CODE: 75-2 REV                                 CLIENT REF: EPA-10

                                 :     :     :        :       :RATING:RATNG
    ITEM ID #  PAGE(S)           :KEY  :STA-:         : BASE  :SENSI-:ALTER
    IMPACT ITEM NAME             :ITEM :TUS  :WEIGHT  :RATING:TIVITY:NTVES
---------------------------------:-----:-----:--------:-------:------:-----
                                 :     :     :        :       :      :
  4100  PP.                      :     :     :        :       :      :
  SOCIAL IMPACTS                 : *** :  M  :SC 100%:  37.50:  1.45: 0.00
                                 :     :     :        :       :      :
    4120  PP.                    :     :     :        :       :      :
    PLANNED LAND USE PATTERN     : *** :  M  :CR 100%:  25.00:  0.73:
                                 :     :     :        :       :      :
    4140  PP.                    :     :     :        :       :      :
    HEALTH AND SAFETY            : *** :  M  :CR 100%:  50.00:  0.73:
                                 :     :     :        :       :      :
  4200  PP.                      :     :     :        :       :      :
  CULTURAL/ESTHETIC IMPACT       :     :  M  :SC 100%:  -1.67:  1.45: 0.00
                                 :     :     :        :       :      :
    4210  PP.                    :     :     :        :       :      :
    ARCHEOLOGICAL/HISTORICAL     :     :  M  :CR 100%:   0.00:  0.48:
                                 :     :     :        :       :      :
    4230  PP.                    :     :     :        :       :      :
    ENTERTAINMENT/RECREATION     :     :  M  :CR 100%:   5.00:  0.48:
                                 :     :     :        :       :      :
    4240  PP.                    :     :     :        :       :      :
    EXT ESTHETIC IMPRESSION      :     :  M  :CR 100%: -10.00:  0.48:
                                 :     :     :        :       :      :
```

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APPENDIX A-3

SUMMARY OUTPUT

The summary computer calculations of the impacts of alternative plans have been revised to include Phase II study information and the development of alternative plan No. 11. This revision uses the URS Company's public opinion survey as the basis for weighting individual impact categories and obtaining a summary score. The procedure by which this is accomplished is presented in Appendix A-1 of the draft EIS.

This section contains the summary calculations of ratings, weights and final scores for each alternative plan. The numerical scores that result from this calculation are intended to aid the evaluator in determining the relative value or environmental impact of each of the various alternatives.

```
                  ***************************************
                  *              E.I.R.S.               *
                  *  ENVIRONMENTAL IMPACT REVIEW SERVICE *
                  *  FOR: KITSAP WASTEWATER TREATMT(1,2,6)*
                  ***************************************
DATE: 04/01/76                                      PAGE:  5  (18061)
CODE: 75-2 REV                                  CLIENT REF: EPA-10

                    ENVIRONMENTAL IMPACT SUMMARY SCORES
                    -----------------------------------

                                  :UNWEIGHTED:          : WEIGHTED:
                                  :  RATING  : WEIGHT*: RATING  :
          ------------------------------------------------------
          PHYSICAL IMPACTS        :     2.4  :  100%  :    2.4  :
          ------------------------------------------------------

          RESOURCE IMPACTS        :    10.0  :   55%  :    5.5  :
          ------------------------------------------------------

          ECONOMIC IMPACTS        :    18.8  :   28%  :    5.3  :
          ------------------------------------------------------

          SOCIO-CULTURAL IMPACTS  :     5.8  :   75%  :    4.4  :
          ------------------------------------------------------



                    OVERALL WEIGHTED RATING**
                  ---------------------------------

                 PROJECT:                     6.82

                 NO PROJECT ALTERNATIVE:      0.00

  *   WEIGHTING FACTORS REFER TO PAGE ONE.

  **  OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
      RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
      NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
      FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
      SUBSTANTIAL IMPACT.
```

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```
             ****************************************
             *              E.I.R.S.                *
             * ENVIRONMENTAL IMPACT REVIEW SERVICE  *
             * FOR: KITSAP WASTEWATER TREATMENT (3) *
             ****************************************
DATE: 04/01/76                                    PAGE: 5  (18063)
CODE: 75-2                                CLIENT REF: EPA-10

               ENVIRONMENTAL IMPACT SUMMARY SCORES
               -----------------------------------

                          :UNWEIGHTED:         : WEIGHTED:
                          :  RATING  : WEIGHT*:  RATING :
     ----------------------------------------------------
     PHYSICAL IMPACTS     :    9.7   : 100%   :   9.7   :
     ----------------------------------------------------

     RESOURCE IMPACTS     :   10.5   :  55%   :   5.8   :
     ----------------------------------------------------

     ECONOMIC IMPACTS     :   19.6   :  28%   :   5.5   :
     ----------------------------------------------------

     SOCIO-CULTURAL IMPACTS :  14.2  :  75%   :  10.6   :
     ----------------------------------------------------




               OVERALL WEIGHTED RATING**
           -------------------------------

           PROJECT:                    12.24

           NO PROJECT ALTERNATIVE:      0.00

*   WEIGHTING FACTORS REFER TO PAGE ONE.

**  OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
    RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
    NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
    FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
    SUBSTANTIAL IMPACT.
```

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```
                    ***************************************
                    *              E.I.R.S.               *
                    *  ENVIRONMENTAL IMPACT REVIEW SERVICE  *
                    *  FOR: KITSAP WASTEWATER TREATMENT (4) *
                    ***************************************
DATE: 04/01/76                                         PAGE:  5  (18064)
CODE: 75-2 REV                                    CLIENT REF: EPA-10

                    ENVIRONMENTAL IMPACT SUMMARY SCORES
                    -----------------------------------

                                 :UNWEIGHTED:           : WEIGHTED:
                                 :  RATING  : WEIGHT*:  RATING  :
    ------------------------------------------------------------
    PHYSICAL IMPACTS             :     9.7  :  100%  :     9.7  :
    ------------------------------------------------------------

    RESOURCE IMPACTS             :    10.5  :   55%  :     5.8  :
    ------------------------------------------------------------

    ECONOMIC IMPACTS             :    20.4  :   28%  :     5.7  :
    ------------------------------------------------------------

    SOCIO-CULTURAL IMPACTS       :    14.2  :   75%  :    10.6  :
    ------------------------------------------------------------



                    OVERALL WEIGHTED RATING**
                 ------------------------------

                 PROJECT:                   12.33

                 NO PROJECT ALTERNATIVE:     0.00

 *    WEIGHTING FACTORS REFER TO PAGE ONE.

 **   OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
      RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
      NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
      FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
      SUBSTANTIAL IMPACT.
```

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```
                    ****************************************
                    *             E.I.R.S.                 *
                    *  ENVIRONMENTAL IMPACT REVIEW SERVICE  *
                    *  FOR: KITSAP WASTEWATER TREATMENT (5) *
                    ****************************************
DATE: 04/01/76                                          PAGE:  5  (18065)
CODE: 75-2 REV                                    CLIENT REF: EPA-10

                     ENVIRONMENTAL IMPACT SUMMARY SCORES
                     -----------------------------------

                                 :UNWEIGHTED:         : WEIGHTED:
                                 :  RATING  : WEIGHT*:  RATING  :
        ---------------------------------------------------------
        PHYSICAL IMPACTS         :      7.3  :  100%  :     7.3  :
        ---------------------------------------------------------

        RESOURCE IMPACTS         :     10.5  :   55%  :     5.8  :
        ---------------------------------------------------------

        ECONOMIC IMPACTS         :     20.4  :   28%  :     5.7  :
        ---------------------------------------------------------

        SOCIO-CULTURAL IMPACTS   :     14.2  :   75%  :    10.6  :
        ---------------------------------------------------------



                    OVERALL WEIGHTED RATING**
                  ------------------------------

                 PROJECT:                   11.41

                 NO PROJECT ALTERNATIVE:    0.00

   *   WEIGHTING FACTORS REFER TO PAGE ONE.

   **  OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
       RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
       NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
       FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
       SUBSTANTIAL IMPACT.
```

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```
                    ***************************************
                    *              E.I.R.S.               *
                    *  ENVIRONMENTAL IMPACT REVIEW SERVICE  *
                    *  FOR: KITSAP WASTEWATER TREATMENT (7) *
                    ***************************************
DATE: 04/01/76
CODE: 75-2 REV                                        PAGE:  5  (18067)
                                                   CLIENT REF: EPA-10

                     ENVIRONMENTAL IMPACT SUMMARY SCORES
                     -----------------------------------

                                 :UNWEIGHTED:          : WEIGHTED:
      -------------------------- :  RATING  : WEIGHT*: RATING  :
      PHYSICAL IMPACTS           :    2.4   : 100%   :   2.4   :
      ---------------------------------------------------------
      RESOURCE IMPACTS           :   10.0   :  55%   :   5.5   :
      ---------------------------------------------------------
      ECONOMIC IMPACTS           :   18.8   :  28%   :   5.3   :
      ---------------------------------------------------------
      SOCIO-CULTURAL IMPACTS     :   14.2   :  75%   :  10.6   :
      ---------------------------------------------------------




                  OVERALL WEIGHTED RATING**
                  -------------------------

                  PROJECT:                     9.24

                  NO PROJECT ALTERNATIVE:      0.00

 *   WEIGHTING FACTORS REFER TO PAGE ONE.

 **  OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
     RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
     NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
     FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
     SUBSTANTIAL IMPACT.
```

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```
           ********************************************
           *              E.I.R.S.                    *
           *  ENVIRONMENTAL IMPACT REVIEW SERVICE     *
           *  FOR: KITSAP WASTEWATER TREATMENT (8)    *
           ********************************************
DATE: 04/01/76                                       PAGE:  5  (18068)
CODE: 75-2 REV                                   CLIENT REF: EPA-10

                  ENVIRONMENTAL IMPACT SUMMARY SCORES
                  -----------------------------------

                                 :UNWEIGHTED:           : WEIGHTED:
                                 :  RATING  : WEIGHT*:  RATING  :
        ------------------------------------------------------------
        PHYSICAL IMPACTS         :     2.0  :  100%  :    2.0   :
        ------------------------------------------------------------

        RESOURCE IMPACTS         :    10.0  :   55%  :    5.5   :
        ------------------------------------------------------------

        ECONOMIC IMPACTS         :    20.4  :   28%  :    5.7   :
        ------------------------------------------------------------

        SOCIO-CULTURAL IMPACTS   :    11.7  :   75%  :    8.8   :
        ------------------------------------------------------------



                  OVERALL WEIGHTED RATING**
              ---------------------------------

              PROJECT:                     8.53

              NO PROJECT ALTERNATIVE:      0.00

 *   WEIGHTING FACTORS REFER TO PAGE ONE.

 **  OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
     RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
     NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
     FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
     SUBSTANTIAL IMPACT.
```

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```
                 *************************************
                 *              E.I.R.S.             *
                 * ENVIRONMENTAL IMPACT REVIEW SERVICE *
                 * FOR: KITSAP WASTEWATER TREATMENT (9) *
                 *************************************
DATE: 04/01/76                                     PAGE:  5  (18069)
CODE: 75-2 REV                                CLIENT REF: EPA-10

                 ENVIRONMENTAL IMPACT SUMMARY SCORES
                 -----------------------------------

                              :UNWEIGHTED:         : WEIGHTED:
                              :  RATING  : WEIGHT*:  RATING  :
      -------------------------------------------------------
      PHYSICAL IMPACTS        :   12.2   :  100%  :   12.2   :
      -------------------------------------------------------

      RESOURCE IMPACTS        :   10.5   :   55%  :    5.8   :
      -------------------------------------------------------

      ECONOMIC IMPACTS        :   20.4   :   28%  :    5.7   :
      -------------------------------------------------------

      SOCIO-CULTURAL IMPACTS  :   11.7   :   75%  :    8.8   :
      -------------------------------------------------------



                 OVERALL WEIGHTED RATING**
            ---------------------------------

            PROJECT:                  12.58

            NO PROJECT ALTERNATIVE:    0.00

  *   WEIGHTING FACTORS REFER TO PAGE ONE.

  **  OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
      RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
      NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
      FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
      SUBSTANTIAL IMPACT.
```

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```
*****************************************
*                E.I.R.S.               *
*  ENVIRONMENTAL IMPACT REVIEW SERVICE  *
*  FOR: KITSAP WASTEWATER TREATMENT(11) *
*****************************************
DATE: 04/01/76                                     PAGE:  5  (18070)
CODE: 75-2 REV                                   CLIENT REF: EPA-10

                 ENVIRONMENTAL IMPACT SUMMARY SCORES
                 -----------------------------------

                                 :UNWEIGHTED:          : WEIGHTED:
                                 :  RATING  : WEIGHT*:   RATING  :
     ----------------------------------------------------------------
     PHYSICAL IMPACTS            :     7.9  :  100%  :     7.9   :
     ----------------------------------------------------------------

     RESOURCE IMPACTS            :    10.5  :   55%  :     5.8   :
     ----------------------------------------------------------------

     ECONOMIC IMPACTS            :    20.4  :   28%  :     5.7   :
     ----------------------------------------------------------------

     SOCIO-CULTURAL IMPACTS      :    17.9  :   75%  :    13.4   :
     ----------------------------------------------------------------



                 OVERALL WEIGHTED RATING**
             ---------------------------------

             PROJECT:                   12.73

             NO PROJECT ALTERNATIVE:     0.00

  *   WEIGHTING FACTORS REFER TO PAGE ONE.

  **  OVERALL PROJECT RATINGS BETWEEN +10 AND -10 INDICATE A MINOR ENVI-
      RONMENTAL IMPACT.  HOWEVER THE CUMULATIVE EFFECTS RESULTING FROM A
      NUMBER OF PROJECTS MAY COMBINE SEVERAL MINOR IMPACTS INTO A SIGNI-
      FICANT IMPACT.  OVERALL RATINGS GREATER THAN +10 OR -10 INDICATE A
      SUBSTANTIAL IMPACT.
```

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APPENDIX B

SOILS

The information presented on soils in the study area is largely derived and/or quoted from the USDA-SCS Soil Survey and interpretation (References 6 and 7) and from the USGS Water Supply Bulletin No. 18 (Reference 5). Soils in the study area portion of Kitsap County are relatively immature from a soil genesis viewpoint. Most soils are developed on or from the mantle of glacial drift deposited during the last glaciation period. Thus, the properties of these soils are still largely those of the parent materials, which in turn were derived from a number of geological formations. Many of the parent materials originated in igneous rocks and interbedded sandstone and shales from the north during the flow of the last glacier into the Puget Sound Basin. These materials are intermixed with granite, basalt, conglomerates, sandstone, shales and other locally prevalent rocks.

The environmental factors which were of greatest importance in contributing to soil formation in Kitsap County are rainfall and vegetation, mitigated in part or altered by the relative resistance offered by poor drainage, unfavorable relief and the relative hardness of parent material. These interactions have resulted in the formation of a wide variety of soils in the study area.

General Soil Characteristics and Distribution

Two distinct groups of soils are recognized in the study area: those with strongly hardened subsoils and those with only slightly compacted or noncompacted subsoils. Soils of the first category (i.e., with a hard pan) usually occur on the broad, undulating or gently rolling ridges and valley slopes; whereas the other soils are found almost entirely on the smoother plains and lower valley slopes. In addition to these two categories, organic soils and miscellaneous land types (rough, mountainous land and steep, broken land) comprise the remainder of the soils in the study area (Reference 6).

The soils underlain by cemented hardpan or bedrock substrate include soils of the Alderwood and Edmonds series. The presence of the hardpan, even at varying depths, generally increases water-holding capacity and reduces deep seepage of water, sewage effluent, etc. applied to the surfaces of these soils.

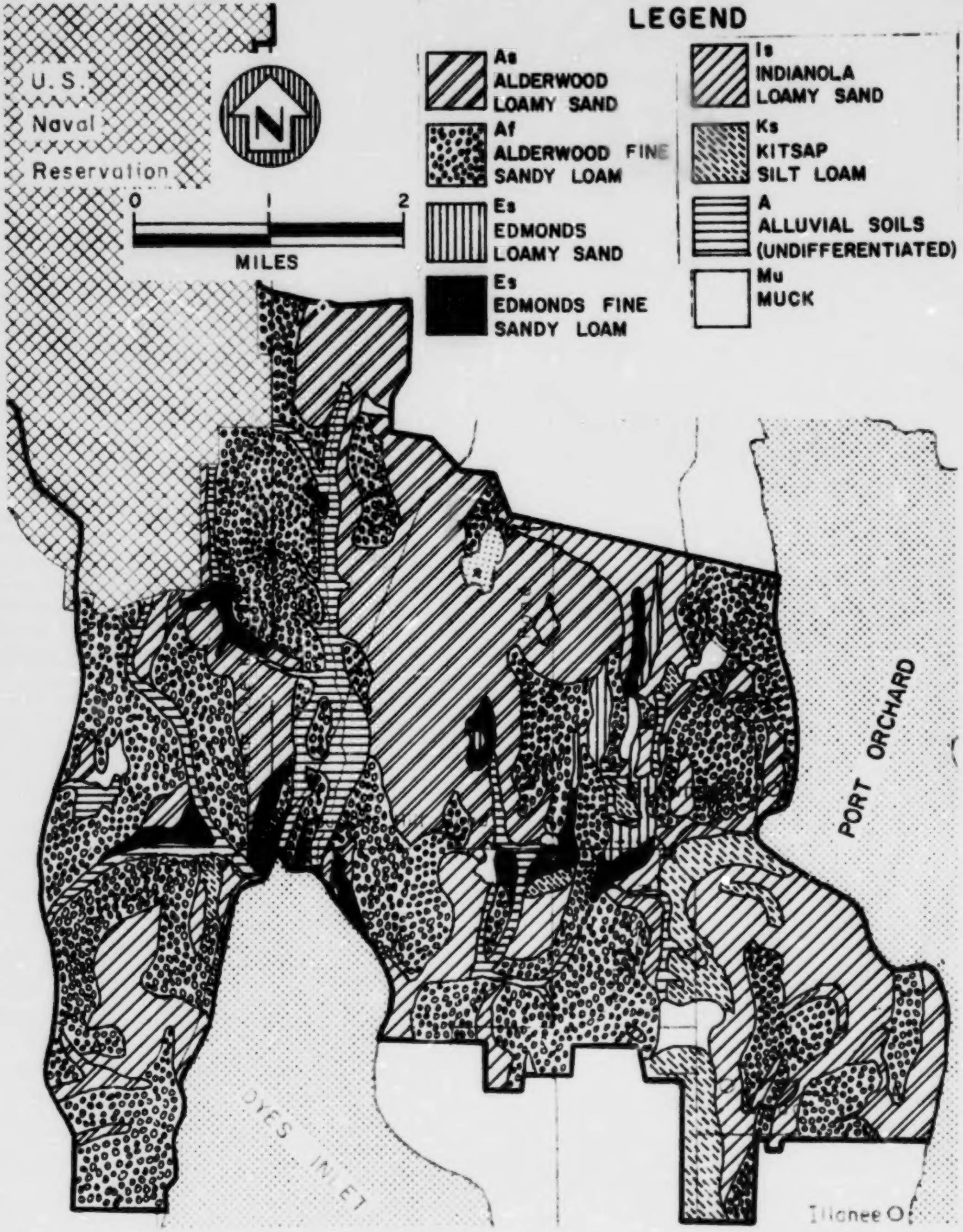
The second group of soils, with permeable subsoils and substrata, include the Everett, Indianola and Kitsap series as well as undifferentiated alluvial soils. These soils generally have a coarser texture than that of soils with hardpans. Drainage is good to excessive except where a high water table is present. The presence of these soils is very limited in the study area.

The organic soils occur only in small, widely scattered areas and are comprised of three types of peat and one muck. These soils have developed through the growth, accumulation and decay of plant remnants mixed with little or no mineral soil materials, under a high water table or under intermittently submerged marsh and swamp conditions. Soils in this category found within the study area include Rifle Peat and Muck.

The distribution of soil series in the study area is shown on Figure B-1.

Suitability of Soils for Septic Tank Filter Fields

Some of the important factors used in establishing the limitations of a soil for a filter field are: (1) local experience of soil scientists and records of performance of existing filter fields, (2) permeability of the subsoil and substratum, (3) depth to consolidated rock or other impervious layers, (4) flooding, (5) seasonal and annual groundwater level and (6) soil slope. Coarse-textured soils (loamy sand, sand and gravel) are rather poor filter field materials because they allow sewage effluent from the septic tanks to travel unfiltered for long distances and to contaminate nearby water supplies. Detergents in solution are readily transmitted through some soils and may pollute groundwater supplies. Sodium salts from water softeners and other sources tend to disperse the clay particles in the soil and reduce its permeability, thus hampering the effectiveness of the filter field.


U.S.
Naval
Reservation
0
1
2
MILES
N
LEGEND
As
ALDERWOOD
LOAMY SAND
Af
ALDERWOOD FINE
SANDY LOAM
Es
EDMONDS
LOAMY SAND
Es
EDMONDS FINE
SANDY LOAM
Is
INDIANOLA
LOAMY SAND
Ks
KITSAP
SILT LOAM
A
ALLUVIAL SOILS
(UNDIFFERENTIATED)
Mu
MUCK
PORT ORCHARD
DYES INLET
Illahee O

Source: Reference 6

Figure B-1. Distribution of soils in the study area

APPENDIX C

AIR QUALITY

INTRODUCTION

The information presented in this section is a summary and restatement of existing air quality conditions prepared by Northwest Environmental Technology Laboratories, Inc. for the URS Company under Phase I of a two-phase study (Reference 1). The final phase will include additional computer modelling of existing air quality conditions.

Carbon monoxide (CO) concentrations, wind speed and wind direction were measured continuously in the vicinity of Silverdale from 25 April 1975 through 13 May 1975 at a selected location within the study area. Following is a summary of the data and a description of the existing conditions.

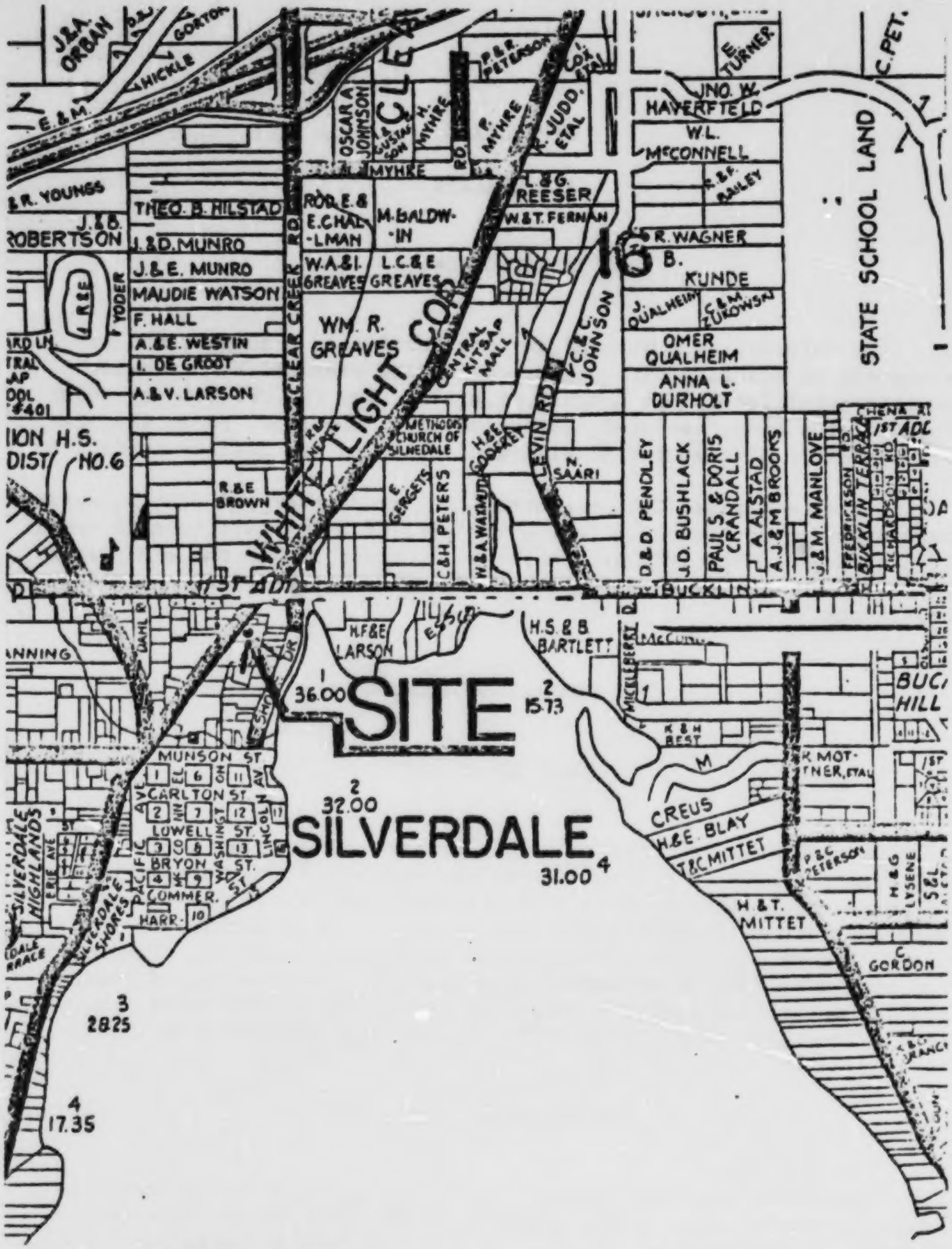
AIR QUALITY MONITORING

Site Selection

On the basis of a review of the project study area, a site was selected at which CO concentrations are expected to be representative of *worst case* concentrations. The criteria used to select the site were based on existing traffic circulation patterns within the study area. Figure C -1 indicates the site monitoring location. Wind speed and wind direction measurements were taken at the location of the air quality monitoring van at a height 15 feet above ground level. Monitoring commenced on 25 April 1975 and continued through 1 May 1975.

Carbon Monoxide Monitor

The carbon monoxide monitor (Ecolyzer) utilized in the measurements is manufactured by Energetics Science, Inc. of New York and measures CO through the principle of electrochemical oxidation. Full-scale range is 50 parts per million (ppm). The instrument has been modified to automatically establish the instrument's baseline once


J.&A. ORBAN
GORTON
HICKLE
E.&M.
OSCAR A. JOHNSON
P.&R. PETERSON
R. JUDD. ETAL
JNO. W. HAVERFIELD
W.L. McCONNELL
E. TURMER
C. PET.
R.&P. BAILEY
R. YOUNGS
J.&B. ROBERTSON
THEO. B. HILSTAD
J.&D. MUNRO
J.&E. MUNRO
MAUDIE WATSON
F. HALL
A.&E. WESTIN
I. DE GROOT
A.&V. LARSON
I. YODER
ROD. E.& E. CHALLMAN
M. BALDWIN
W.A.&I. GREAVES
L.C.& E GREAVES
WM. R. GREAVES
L.&G. REESER
W.&T. FERNAN
R. WAGNER
B. KUNDE
16
STATE SCHOOL LAND
J. QUALHEIM
C.&M. ZUKOWSKI
OMER QUALHEIM
ANNA L. DURHOLT
V.C.&C. JOHNSON
LEVIN RD
CLEAR CREEK RD
WHITE LIGHT COR
CENTRAL KITSAP MALL
METHODIST CHURCH OF SILVERDALE
H.&E. GOOKEY
N. SAARI
E. GERGETS
C.&H. PETERS
H.&A. WARMUTH
UNION H.S. DIST NO.6
R.&E. BROWN
D.&D. PENDLEY
J.D. BUSHLACK
PAUL S. & DORIS CRANDALL
A. ALSTAD
A.J.&M BROOKS
J.&M. MANLOVE
FREDRIKSON
BUCKLIN TERRACE
1ST ADD
BUCKLIN
H.F.&E. LARSON
H.S.&B. BARTLETT
MICKELBERRY
BUCKLIN HILL
1
36.00
SITE
2
15.73
R.&H. BEST
R. MOTTNER, ETAL
DAHL
MUNSON ST
CARLTON ST
LOWELL ST
BRYON ST
COMMER.
HARR.
PACIFIC AVE
WASHINGTON
LINCOLN AV
2
32.00
SILVERDALE
4
31.00
SILVERDALE HIGHLANDS
SILVERDALE SHORES
CREUS
H.&E. BLAY
T.&C. MITTET
P.&C. PETERSON
H.&T. MITTET
H.&G. LYSENE
GORDON
3
28.25
4
17.35

Source: Reference 1

Figure C-1. Location of carbon monoxide monitoring station per 40 minutes.

Several separate studies have shown the Ecolyzer to be an excellent instrument for the purpose for which it was used. The large and varied list of organizations that employ the Ecolyzer to monitor the concentrations of CO attest to its acceptance in the field of air pollution. In addition, several separate studies have indicated a very high correlation between the Ecolyzer and the nondispersive infrared (NDIR) CO monitor, which is the reference method specified by the Environmental Protection Agency.

Wind Measurements

Low threshold wind speed and direction monitoring equipment manufactured by R. M. Yound Company of Traverse City, Michigan was utilized. Wind speed and direction were recorded continuously on a dual channel strip chart recorder. The wind speed indicator has a starting threshold of about 0.75 miles per hour (mph), and the wind direction indicator has an electronic accuracy of ± 1.5° azimuth.

Data Reduction

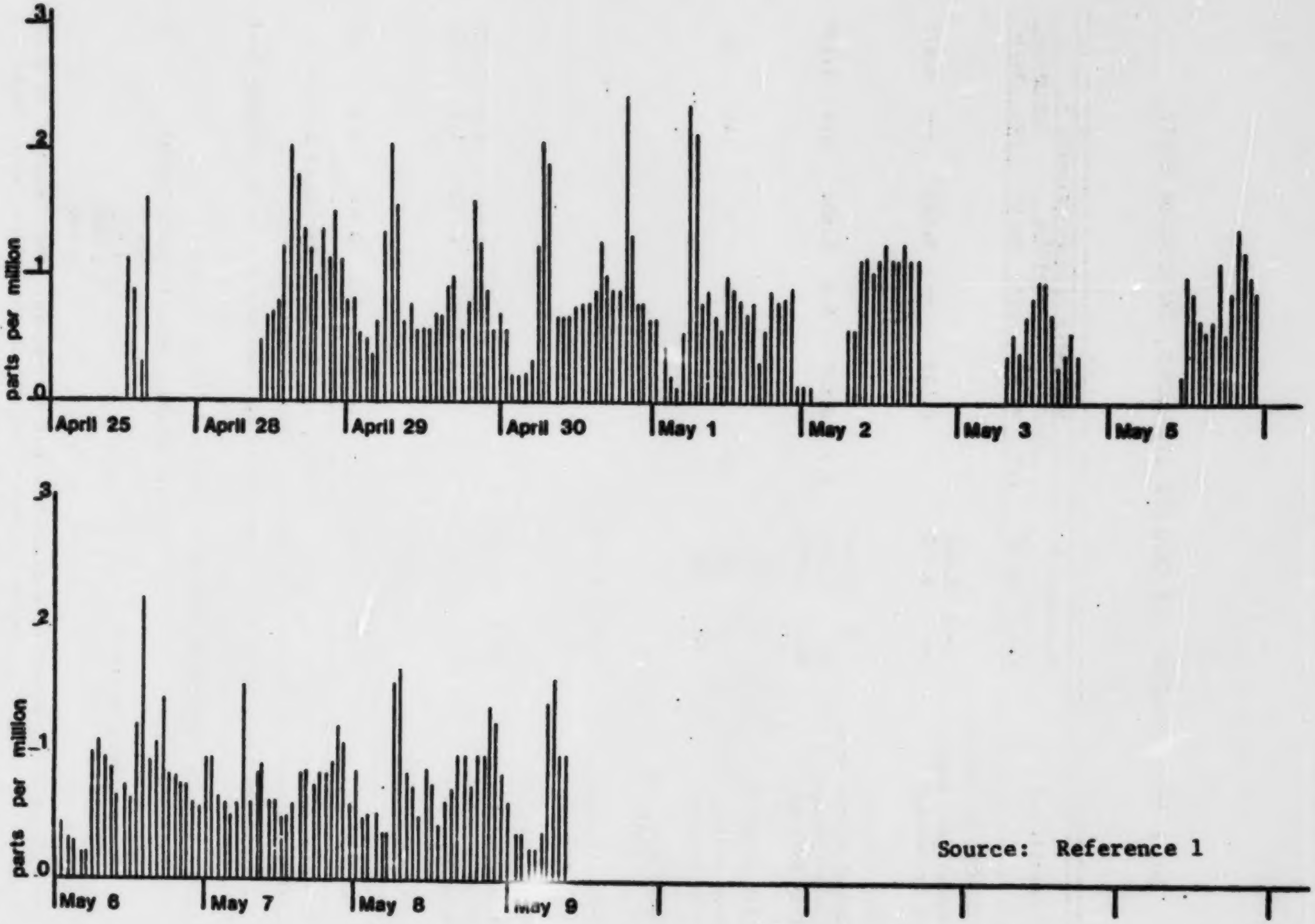
Average hourly values of wind speed, wind direction and CO concentrations were scaled from the strip charts. Span sensitivity and zero level were carefully noted on the CO recordings and taken into account during the data reduction process. The peak level of CO observed within each hour was also recorded.

METEOROLOGY

The monitoring site was located just north of Dyes Inlet, 50 feet east of Old State Route 3 and 300 feet south of Bucklin Hill Road. The monitoring location was in a shallow north-south valley which intersects with Dyes Inlet. This topography tends to channel the wind in a north-south direction. Measurements commenced during a period of weather typified by scattered clouds and occasional sunshine. Stormy conditions occurred during the mid-monitoring period. The latter phase of the monitoring period experienced generally fair conditions with low wind speeds.

EXISTING CONDITIONS ESTABLISHED BY ON-SITE MONITORING

Figure C-2 shows a bar graph which indicates average hourly values of CO during the course of the monitoring program. Referring to the Ambient Air Quality Standards given in Table C-1, it is seen that the observed values of CO concentration are well below the one-hour and eight-hour values set by the standards.



Source: Reference 1

Figure -2. Average hourly values of carbon monoxide

Table C-1. AMBIENT AIR QUALITY STANDARDS, WASHINGTON STATE

Constituent	Standards [b]		Emergency episode criteria [a]					
			Alert		Warning		Emergency	
	ppm [c]	mg/m^3	ppm	mg/m^3	ppm	mg/m^3	ppm	mg/m^3
Suspended particulate								
Annual geo. mean	--	0.060						
24-hr average	--	0.150	--	0.375	--	0.625	--	0.875
Sulfur dioxide								
Annual arith. mean	0.02	0.060						
24-hr average	0.1	0.260	0.3	0.800	0.6	1.600	0.8	2.100
1-hr average	0.4	1.060						
Carbon monoxide								
8-hr average	9	10	15	17	30	34	40	46
1-hr average	35	40						
Hydrocarbons (as methane) [d]								
3-hr average, 6-9 a.m.	0.24	0.160	—		—		—	
Nitrogen dioxide								
Annual arith. mean	0.05	0.100						
24-hr average			0.15	0.282	0.3	0.565	0.4	0.750
1-hr average			0.6	1.130	1.2	2.260	1.6	3.000
Photochemical oxidants								
1-hr average	0.08	0.160	0.2	0.400	0.4	0.800	0.6	1.200

[a] In order to activate the emergency episode plan, the value indicated must be exceeded and expected to remain so for more than 12 hours.

[b] All standards based on 24-hr or less averaging times are not to be exceeded more than once per year.

[c] Volume to mass conversion factors at 25°C and 760 mm Hg are:

Sulfur dioxide	one part per million equals	2.620 mg/m^3
Carbon monoxide		1.150
Hydrocarbons (methane)		0.655
Nitrogen dioxide		1.880
Oxidants		1.960

[d] The hydrocarbon *standard* is a guideline, not a standard. More needs to be done to establish background concentrations of methane in the ambient air. There are no emergency eipsode standards for hydrocarbons.

APPENDIX D

BIOLOGICAL INVENTORY

APPENDIX D-1

PRINCIPAL PLANT SPECIES AND OCCURRENCE WITHIN STUDY AREA

		Biotic communities						
Common name	**Scientific name**	Coniferous Forest 1	Broadleaf Forest 2	Mixed Coni.-Broad. 3	Pasture-Meadow 4	Freshwater Marsh 5	Residential 6	Marine Shoreline 7
Trees								
Alder, red	*Alnus rubra*	x	x	x	x	x		
Adler, Sitka	*Alnus sinuata*			x				
Bitter cherry	*Prunus emarginata*		x	x				
Black hawthorn	*Crataegus douglasii*	x						
Cascara	*Rhamnus purshiana*		x	x				
Douglas-fir	*Pseudotsuga menziesii*	x	x	x		x	x	
Madrona	*Arbutus menziesii*		x	x				
Maple, bigleaf	*Acer macrophyllum*	x	x	x			x	
Maple, vine	*Acer circinatum*			x				
Pacific crabapple	*Malus diversifolia*		x	x				
Pacific dogwood	*Cornus nuttallii*	x	x	x	x			
Pacific willow	*Salix lasiandra*		x	x	x	x		
Pacific yew[a]	*Taxus brevifolia*	x		x				
Western hemlock	*Tsuga heterophylla*	x	x	x				
Western redcedar	*Thuja plicata*	x		x				
Western white birch	*Betula papyrifera*			x	x			
Western white pine	*Pinus monticola*	x	x	x				
Shrubs								
Blackberry, evergreen	*Rubus laciniatus*		x	x			x	
Blackberry, Pacific	*Rubus ursinus*	x	x	x				
Blackberry, trailing	*Rubus vitifolius*			x	x			
Blackcap	*Rubus leucodermis*	x	x	x	x			
Devil's club	*Oplopanax horridus*			x				
Hardhack	*Spiraea douglasii*	x	x	x				
Hazel	*Corylus cornuta var. californica*		x	x				
Honeysuckle, orange	*Lonicera ciliosa*	x	x	x				
Honeysuckle, purple	*Lonicera hispidula*			x				
Huckleberry, evergreen	*Vaccinium ovatum*	x		x				
Huckleberry, red	*Vaccinium parvifolium*	x	x	x				
Indian plum	*Osmaronia cerasiformis*	x	x	x			x	
Ninebark	*Physocarpus capitatus*		x	x				
Ocean spray	*Holodiscus discolor*	x	x	x			x	

PRINCIPAL PLANT SPECIES AND OCCURRENCE WITHIN STUDY AREA (cont'd)

Common name	Scientific name	Biotic communities Coniferous Forest 1	 Broadleaf Forest 2	 Mixed Coni.-Broad. 3	 Pasture-Meadow 4	 Freshwater Marsh 5	 Residential 6	 Marine Shoreline 7
Shrubs, cont'd								
Oregon grape	*Mahonia nervosa*	x		x	x			
Red currant	*Ribes sanguineum*	x	x	x				
Red rhododendron	*Rhododendron macrophyllum*	x	x	x			x	
Redberry elder	*Sambucus callicarpa*		x	x	x			
Rose	*Rosa* sp.	x	x	x				
Rose, wood	*Rosa gymnocarpa*	x		x				
Salal	*Gaultheria shallon*	x	x	x				
Salmonberry	*Rubus spectabilis*		x	x	x			
Scotch broom	*Cytisus scoparius*	x	x	x			x	
Swamp gooseberry	*Ribes lacustre*		x	x				
Thimbleberry	*Rubus parviflorus*	x	x	x				
Twin-flower	*Linnaea borealis*	x		x				
Waxberry	*Symphoricarpos albus*		x	x				
Willow, Hooker	*Salix hookeriana*				x	x		
Willow, Scouler	*Salix scouleriana*	x		x				
Willow, Sitka	*Salix sitchensis*		x			x		
Herbs								
Agoseris	*Agoseris* sp.			x	x			
Bedstraw	*Galium boreale*		x	x				
Bulrush	*Scirpus* sp.							x
Bur-clover	*Medicago hispida*						x	
Buttercup, creeping	*Ranunculus repens*			x	x			
Buttercup, western	*Ranunculus occidentalis*			x	x			
Cat-tail	*Typha latifolia*					x		
Chamomile	*Anthemis* sp.						x	
Clover	*Trifolium* sp.			x	x		x	x
Common horsetail	*Equisetum arvense*			x		x	x	
Common St. Johnswort	*Hypericum perforatum*			x			x	
Curly dock	*Rumex crispus*		x	x			x	x
Drummond rush	*Juncus drummondii*				x	x		x
False Solomon's seal	*Smilacina amplexicaulis*			x				

PRINCIPAL PLANT SPECIES AND OCCURRENCE WITHIN STUDY AREA (cont'd)

		Biotic Communities						
Common name	Scientific name	Coniferous Forest 1	Broadleaf Forest 2	Mixed Coni.-Broad. 3	Pasture-Meadow 4	Freshwater Marsh 5	Residential 6	Marine Shoreline 7
Herbs, cont'd								
Field mint	*Mentha arvensis*				x			
Fireweed	*Epilobium angustifolium*	x	x	x	x			
Forget-me-not	*Myosotis* sp.			x				
Foxglove	*Digitalis purpurea*			x	x		x	
Gumplant	*Grindelia* sp.						x	
Hairy cat's ear	*Hypochaeris radicata*			x			x	x
Lupine	*Lupinus* sp.			x				
Monkey flower	*Mimulus* sp.		x	x	x	x		
Morning glory	*Convolvulus* sp.						x	
Mountain sweetroot	*Osmorhiza chilensis*	x		x				
Ox-eye daisy	*Chrysanthemum leucanthemum*			x	x			
Pea, beach	*Lathyrus maritimus*							x
Pea, purple	*Lathyrus nuttallii*						x	
Pickleweed	*Salicornia virginica*							x
Plantain, common	*Plantago major*		x	x				
Plantain, English	*Plantago lanceolata*			x	x		x	x
Prickly lettuce	*Lactuca serriola*						x	
Self-heal	*Prunella vulgaris* ssp. *lanceolata*				x			
Siberian miner's lettuce	*Claytonia sibirica*	x	x	x				
Silver beachweed	*Franseria chamissonis*							x
Skunk cabbage	*Lysichitum americanum*			x		x		
Small-flower alumroot	*Heuchera micrantha*			x				
Snakeroot	*Sanicula* sp.	x		x				
Spring gold	*Lomatium utriculatum*			x			x	
Starflower	*Trientalis latifolia*		x	x	x	x		
Stinging nettle	*Urtica lyallii*		x	x				
Thistle	*Cirsium* sp.	x	x	x			x	
Vetch	*Vicia* sp.						x	
Violet	*Viola* sp.			x				
Watercress	*Rorippa nasturtium-aquaticum*			x		x		
Western trillium	*Trillium ovatum*			x				

PRINCIPAL PLANT SPECIES AND OCCURRENCE WITHIN STUDY AREA (cont'd)

Common name	Scientific name	Biotic Communities						
		Coniferous Forest 1	Broadleaf Forest 2	Mixed Coni.-Broad. 3	Pasture-Meadow 4	Freshwater Marsh 5	Residential 6	Marine Shoreline 7
Herbs, cont'd								
Wild Lily of the valley	*Maianthemum dilatatum*			x				
Yarrow	*Achillea millefolium*				x			x
Youth-on-age	*Tolmiea menziesii*	x		x				
Ferns								
Bracken	*Pteridium aquilinum var. pubescens*	x	x	x	x		x	
Lady	*Athyrium filex-femina*		x	x				
Licorice	*Polypody* sp.		x	x				
Sword	*Polystichum munitum*	x	x	x	x		x	
Grass								
Alkali cordgrass	*Spartina gracilis*							x
Bentgrass	*Agrostis* sp.						x	
Bluegrass	*Poa* sp.						x	
Fescue	*Festuca* sp.						x	
Fescue, western	*Festuca occidentalis*						x	
Perennial ryegrass	*Lolium perenne*						x	
Prairie wedgegrass	*Sphenopholis obtusa*						x	
Wheatgrass	*Agropyron* sp.						x	
Wildrye, blue	*Elymus glaucus*						x	
Wildrye, dune	*Elymus mollis*						x	

[a] Not observed, but reported to occur.

Source: References 1, 8, 9, 10, 14, 18, 22 and site visits

APPENDIX D-2

COMMON BIRDS AND THEIR PROBABLE OCCURRENCE WITHIN STUDY AREA[a]

Common name	Scientific name	Biotic communities						
		Coniferous Forest 1	Broadleaf Forest 2	Riparian/Lakes 3	Pasture-Meadow 4	Marsh/Brackish 5	Residential 6	Marine Shoreline 7
Water-associated birds								
Common loon	*Gavia immer*			O				C
Arctic loon	*Gavia artica*							O
Horned grebe	*Podiceps auritus*			O				C
Western grebe	*Aechmophorus occidentalis*			O				C
Eared grebe	*Podiceps caspicus*							O
Pied-billed grebe	*Podilymbus podiceps*							O
Red-necked grebe	*Podiceps grisegna*							C
Double-breasted cormorant	*Phalacrocorax auritus*							C
Brandt's cormorant	*Phalacrocorax penicillatus*							C
Pelagic cormorant	*Phalarocorax pelagicus*							C
White pelican	*Pelecanus erythrorhynchos*							O
Great blue heron	*Ardea herodias*			O		C		C
Green heron	*Butorides virescens*							O
Snowy egret	*Leucophoyx thula*					O		O
American bittern	*Botaurus lentiginosus*			O				O
Whistling swan	*Olor columbianus*			O				O
Canada goose	*Branta canadensis*					O		
Black brant	*Branta nigricans*							C
White-fronted goose	*Anser albifrons*							O
Snow goose	*Chen hyperborea*					O		
Mallard	*Anas platyrhyncos*			C				C
Pintail	*Anas acuta*			O				C
Green-winged teal	*Anas carolinensis*			C				C
Blue-winged teal	*Anas discors*			O				O
Cinnamon teal	*Anas cyanoptera*			O				O
European widgeon	*Mareca penelope*							O
American widgeon	*Mareca americana*			O				C
Shoveler	*Spatula clypeata*			O		O		
Redhead	*Aythya americana*							O
Canvasback	*Aythya valisineria*							O
Greater scaup	*Aythya marila*							C
Lesser scaup	*Aythya affinis*							O
Common goldeneye	*Bucephala clangula*			O				C
Barrow's goldeneye	*Bucephala islandica*			O				C
Bufflehead	*Bucephala albeola*			O				C
Oldsquaw	*Clangula hyemalis*							O
White-winged scoter	*Melanitta deglandi*							O
Surf scoter	*Melanitta perspicillata*							O
Common scoter	*Oidemia nigra*							C
Ruddy duck	*Oxyura jamaicensis*			O				O
Hooded merganser	*Lophodytes cucullatus*			O				O
Common merganser	*Mergus merganser*			O				O
Red-breasted merganser	*Mergus serrator*			C				C
American coot	*Fulica americana*			C				C

COMMON BIRDS AND THEIR PROBABLE OCCURRENCE WITHIN STUDY AREA (cont'd)

Common name	Scientific name	Biotic communities Coniferous Forest 1	Broadleaf Forest 2	Riparian/Lakes 3	Pasture-Meadow 4	Marsh/Brackish 5	Residential 6	Marine Shoreline 7
Water-associated birds (cont'd)								
Semipalmated plover	*Charadrius semipalmatus*				O			
Killdeer	*Charadrius vociferus*				O	O		C
Black-bellied plover	*Squatarola squatarola*					O		
Common snipe	*Capella gallinago*							C
Whimbrel	*Numenius phaeopus*					O		O
Spotted sandpiper	*Actitis macularia*							C
Greater yellow legs	*Totanus melanoleucus*					O		C
Lesser yellowlegs	*Totanus flavipes*					C		C
Pectoral sandpiper	*Erolia melanotos*					O		
Baird's sandpiper	*Erolia bairdii*					O		
Least sandpiper	*Erolia minutilla*							C
Dunlin	*Erolia alpina*							C
Short-billed dowitcher	*Limnodromus griseus*							C
Long-billed dowitcher	*Limnodromus scolopaceus*			O		O		O
Western sandpiper	*Ereunetes mauri*							C
Sanderling	*Crocethia alba*							O
Northern phalarope	*Lobipes lobatus*							O
Parasitic jaeger	*Stercorarius parasiticus*							O
Glaucus-winged gull	*Larus glaucescens*							C
Herring gull	*Larus argentatus*							O
Thayer's gull	*Larus thayeri*							C
California gull	*Larus californicus*							C
Ring-billed gull	*Larus delawarensis*							C
Mew gull	*Larus canus*							C
Franklin's gull	*Larus pipixcan*							O
Bonaparte's gull	*Larus philadelphia*							C
Common tern	*Sterna hirunda*							C
Caspian tern	*Hydroprogne caspia*							C
Land-associated birds								
Turkey vulture	*Cathartes aura*	C	C		C	O		
Cooper's hawk	*Accipiter cooperii*	O	C	O				
Red-tailed hawk	*Buteo jamaicensis*	O	O	O	C			
Bald eagle	*Hiliaeetus leucocephalus*			O				O
Marsh Hawk	*Circus cyaneus*				C	C		C
Sparrow hawk	*Falco sparverius*				O	O		
Blue grouse	*Dendragapus obscurus*	O						
Ruffed grouse	*Bonasa umbellus*	O	O					
California quail	*Lophortyx californicus*			O	O			
Mountain quail	*Oreortyx pictus*		O	O				
Ring-necked pheasant	*Phasianus colchicus*				O	O		
Band-tailed pigeon	*Columba fasciata*	C	O	O				
Mourning dove	*Zenaidura macroura*			O	C	O	C	
Barn owl	*Tyto alba*				O		O	

COMMON BIRDS AND THEIR PROBABLE OCCURRENCE WITHIN STUDY AREA (cont'd)

Common name	Scientific name	Biotic communities						
		Coniferous Forest 1	Broadleaf Forest 2	Riparian/Lakes 3	Pasture-Meadow 4	Marsh/Brackish 5	Residential 6	Marine Shoreline 7
Land-associated birds (cont'd)								
Screech owl	*Otus asio*		O	C			O	
Short-eared owl	*Asio flammeus*				O	C	O	
Anna's hummingbird	*Calypte anna*		O	O				
Rufous hummingbird	*Selasphorus rufus*	O	O	C				
Belted kingfisher	*Megaceryle alcyon*			O		O		O
Red-shafted flicker	*Colaptes cafer*	C	C				O	
Hairy woodpecker	*Dendrocopos villosus*	C		O				
Downy woodpecker	*Dendrocopos pubescens*		C	O			O	
Say's phoebe	*Sayornis sayos*			O	O		O	
Traill's flycatcher	*Empidonax traillii*		O	C				
Western flycatcher	*Empidonc difficilis*	C		O				
Olive-sided flycatcher	*Nuttallornis borealis*	C	C	C				
Horned lark	*Eremophila alpestris*				C	O		
Violet-green swallow	*Tachycineta thalassina*		O	O	O		O	
Barn swallow	*Hirundo rustica*				C	C	C	O
Cliff swallow	*Petrochelidon pyrrhonota*				O	O	C	
Steller's jay	*Cyanocitta stelleri*	C		O			O	
Common crow	*Corvus caurinus*				C	O	O	
Black-capped chickadee	*Parus atricapillus*		O	C			C	
Chestnut-backed chickadee	*Parus rufescens*	C		C				
Common bushtit	*Psaltriparus minimus*	O		C			C	
Red-breasted nuthatch	*Sitta canadensis*	C						
Brown creeper	*Certha familiaris*	C						
Dipper	*Cinclus mexicanus*			O				
Bewick's wren	*Thryomanes bewickii*		O	O		O	C	O
Robin	*Turdus migratorius*				C		C	
Varied thrush	*Ixoreus naevius*	C						
Swainson's thrush	*Hylocichla ustulata*		C	C				
Townsend's solitaire	*Myadestes townsendi*	C						
Golden-crowned kinglet	*Regulus satrapa*	C						
Water pipit	*Antnus spinoletta*				O	O		O
Cedar waxwing	*Bombycilla cedrorum*		O	O	O			
Hutton's vireo	*Vireo huttoni*		O	O				
Warbling vireo	*Vireo gilvus*		C	C				
Orange-crowned warbler	*Vermivora celata*		C					
Yellow warbler	*Dendroica petechia*		C	O			O	
Myrtle warbler	*Dendroica coronata*		O	C				
Audobon's warbler	*Dendroica audonboni*	C	O	C				
Black-throated gray warbler	*Dendroica nigrescens*	C						
Townsend's warbler	*Dendroica townsendi*	C						
MacGillivray's warbler	*Oporornis tolmiei*		O	C				
Wilson's warbler	*Wilsonia pusilla*	C	O	O			O	
House sparrow	*Passer domesticus*				O		C	
Western meadowlark	*Sturnella neglecta*				C			
Red-winged blackbird	*Agelaius phoeniceus*				O	C		

COMMON BIRDS AND THEIR PROBABLE OCCURRENCE WITHIN STUDY AREA (cont'd)

		Biotic communities						
Common name	Scientific name	Coniferous Forest 1	Broadleaf Forest 2	Riparian/Lakes 3	Pasture-Meadow 4	Marsh/Brackish 5	Residential 6	Marine Shoreline 7
Land-associated birds (cont'd)								
Brewer's blackbird	*Euphagus cyanocephalus*				C		O	
Bullock's oriole	*Icterus bullockii*		C	O	O	O		
Western tanager	*Piranga ludoviciana*	C	C	C				
Evening grosbeak	*Hesperiphona vespertina*	C	O	O			O	
Pine grosbeak	*Pinicola enucleator*	C	O	O			O	
Purple finch	*Carpodacus purpureus*	O	C	O				
House finch	*Carpodacus mexicanus*						C	
Pine siskin	*Spinus pinus*	C						
American goldfinch	*Spinus tristis*		C	O	O			
Red crossbill	*Loxia curvirostra*	O	O					
Rufous-sided towhee	*Pipilio erythrophthalmus*	O	O	O				
Slate-colored junco	*Junco hyemalis*		O					
Oregon junco	*Junco oreganus*	O	C	O	O			
Savannah sparrow	*Passerculus sandwichensis*				O	C		O
White-crowned sparrow	*Zonotrichia leucophrys*			C	O	C		O
Golden-crowned sparrow	*Zonotrichia atricapilla*		O	O	O			
Song sparrow	*Melospiza melodia*			C	O	C	O	O

[a] key to occurrence

C = common or seasonal resident

O = occasional

Source: References 1, 8, 13, 14, 16, 17 and 22

APPENDIX D-3

MAMMALS AND THEIR PROBABLE OCCURRENCE WITHIN STUDY AREA

Common name	Scientific name	Biotic communities Coniferous Forest 1	Broadleaf Forest 2	Mixed/Riparian 3	Pasture Meadow 4	Freshwater Marsh 5	Residential 6	Marine Shoreline 7
Dusky shrew	*Sorex obscurus*			x		x		
Vagrant shrew	*Sorex vagrans*			x		x		
Water shrew	*Sorex palustris*			x		x		
Marsh shrew	*Sorex bandirii*			x		x		
Masked shrew	*Sorex cinereus*		x	x		x		
Trowbridge shrew	*Sorex trowbridgii*	x		x				
Townsend mole	*Scapanus townsendii*				x		x	
Coast mole	*Scapanus orarius*		x		x			
Shrew-mole	*Neorotrichus gibbsii*			x				
Little brown myotis	*Myotis lucifugus*			x				
Keen myotis	*Myotis keenii*		x	x				
California myotis	*Myotis californicus*	x	x	x				
Hairy-winged myotis	*Myotis volans*	x	x	x				
Long-eared myotis	*Myotis evotis*	x	x	x				
Yuma myotis	*Myotis yumanensis*		x	x				
Silvery-haired bat	*Lasionylteris noctivagans*		x	x				
Big brown bat	*Eptesicus fuscus*		x					
Hoary bat	*Lasiurus cinereus*		x					
Lump nosed bat	*Plecotus townsendii*		x					
Snowshoe hare	*Lepus americanus*	x	x	x				
Eastern cottontail	*Sylvilagus floridanus*		x		x		x	
Mountain beaver	*Aplodontia rufa*	x	x	x			x	
Hoary marmot	*Marmota caligata*				x			
Townsend chipmunk	*Eutamias townsendii*	x		x				
Merriam chipmunk	*Eutamias merriami*		x	x				
Long-eared chipmunk	*Eutamias quadrimaculatus*	x						
Douglas squirrel	*Tamiasciurus douglasii*	x						
Western gray squirrel	*Sciurus griseus*		x	x				
Northern flying squirrel	*Glaucomys sabrinus*	x						
Mazama pocket gopher	*Thomomys mazama*				x		x	
Beaver	*Castor canadensis*			x		x		
Deer mouse	*Peromyscus maniculatus*			x	x	x		

MAMMALS AND THEIR PROBABLE OCCURRENCE WITHIN STUDY AREA (cont'd)

Common name	Scientific name	Biotic communities						
		Coniferous Forest 1	Broadleaf Forest 2	Mixed/Riparian 3	Pasture Meadow 4	Freshwater Marsh 5	Residential 6	Marine Shoreline 7
Bushy-tailed wood rat	*Neotoma cinerea*		x	x				
Northern bog vole	*Synaptomys borealis*				x	x		
Gapper red-backed mouse	*Clethrionomys gapperi*				x			
Long-tailed meadow mouse	*Microtus longicaudus*			x	x			
Oregon meadow mouse	*Microtus oregoni*				x	x		
Townsend meadow mouse	*Microtus townsendii*				x			
Muskrat	*Ondatra zibetnica*			x		x		
Pacific jumping mouse	*Zapus trinotatus*				x			
Coyote	*Canis latrans*	x	x	x	x	x		
Black bear	*Euarctos americanus*	x	x	x				
Racoon	*Procyon lotor*	x	x	x	x	x	x	
Ermine	*Mustela erminea*	x						
Long-tailed weasel	*Mustela fernata*		x	x	x			
Fisher	*Martes pennanti*	x						
Mink	*Mustela vison*			x		x		
Marten	*Martes americana*	x	x	x				
Striped skunk	*Mephitis mephitis*	x	x	x	x			
Spotted skunk	*Spilogale putorius*	x	x	x	x			
River otter	*Lutra canadensis*			x				
Sea otter	*Enydra lutris*							x
Mountain lion	*Felis concolor*	x	x	x				
Bobcat	*Lynx rufus*	x	x	x	x			
Harbor seal	*Phoca vitulina*							x
Black-tailed deer	*Odocoileus hemionus columbianus*	x	x	x	x		x	
Canadian elk	*Cervus canadensis nelsoni*	x	x	x	x			

Source: References 1, 8, 10, 11, 12, 14, 19, 20 and 22

APPENDIX D-4

AMPHIBIANS AND REPTILES AND THEIR PROBABLE OCCURRENCE WITHIN STUDY AREA

Common name	Scientific name	Biotic communities Coniferous Forest 1	Broadleaf Forest 2	Mixed/Riparian 3	Pasture-Meadow 4	Freshwater Marsh 5	Residential 6	Marine Shoreline 7
Western long-toed salamander	*Ambystoma macrodactylum macrodactylum*	x	x	x				
Northwestern salamander	*Ambystoma gracile gracile*	x	x	x				
Northern Olympic salamander	*Rhyacotriton olympicus olympicus*	x	x	x				
Pacific giant salamander	*Dicamptodon ensatus*	x	x	x				
Western red-backed salamander	*Plethodon vehiculum*	x	x	x				
Van Dyke's salamander	*Plethodon vandykei vandykei*	x	x	x				
Rough-skinned newt	*Taricha granulosa*	x	x	x	x			
Pacific treefrog	*Hyla regilla*		x	x		x		
Bullfrog	*Rana catesbeiana*			x		x		
Tailed frog	*Ascaphus truei*	x		x		x		
Northern red-legged frog	*Rana aurora aurora*			x		x		
Boreal toad	*Bufo boreas boreas*		x	x	x		x	
Western spotted frog	*Rana pretiosa pretiosa*		x	x		x		
Northern alligator lizard	*Gerrhonotus coeruleus principis*	x	x	x				
Northwestern garter snake	*Thamnophis ordinoides ordinoides*	x	x	x	x	x	x	
Puget Sound red-sided garter snake	*Thamnophis sirtalis pickeringi*	x	x	x	x	x	x	
Pacific rubber boa	*Charina bottae bottae*	x	x	x	x			

Source: References 1, 8, 15 and 22

APPENDIX D-5

PROBABLE FISH SPECIES AND ABUNDANCE WITHIN THE STUDY AREA

Common Name	Scientific Name	Central Puget Sound	Port Orchard	Seattle
River lamprey	*Lampetra ayresi*	+		+
Sixgill shark	*Hexanchus griseus*	+		+
Basking shark	*Cetorhinus maximus*			+
Salmon shark	*Lamna ditropis*	+		+
Brown cat shark	*Apristurus brunneus*	*		*
Pacific sleeper shark	*Somniosus pacificus*			+
Spiny dogfish	*Squalus acanthias*	0	0	0
Pacific angel shark	*Squatina californis*			+
Pacific electric ray	*Torpedo californis*	+	+	
Big skate	*Raja binoculata*	+	*	+
Longnose skate	*Raja rhina*	*	*	*
Ratfish	*Hydrolagus colliei*	0	*	0
White sturgeon	*Acipenser transmontanus*		+	+
American shad	*Alosa sapidissima*	+	+	*
Pacific herring	*Clupea harengus pallasi*	0	0	0
Pacific sardine	*Sardinops sagax*		+	
Northern anchovy	*Engraulis mordax*	+	*	+
Pink salmon	*Oncorhynchus gorbuscha*	0	*	0
Chum salmon	*Oncorhynchus keta*	0	+	0
Coho salmon	*Oncorhynchus kisutch*	0	+	0
Sockeye salmon	*Oncorhynchus nerka*	0	+	0
Chinook salmon	*Oncorhynchus tshawytseha*	0	0	0
Cutthroat trout	*Salmo clarki*	+	*	*
Rainbow trout	*Salmo gairdneri*	+		+
Dolly Varden	*Salvelinus malma*	+		*
Surf smelt	*Hypomesus pretiosus*	*	0	0
Longfin smelt	*Spirinchus thaleichthys*	*	+	*
Eulachon	*Thaleichthys pacificus*	+		+
Longnose lancetfish	*Alepisaurus ferox*	+		
California headlightfish	*Diaphus theta*	+		
Northern lampfish	*Stenobrachius leucopsarus*	+		
Plainfin midshipman	*Porichthys natatus*	0	0	0
Northern clingfish	*Gobiesox maeandricus*		*	+
Pacific cod	*Gadus macrocephalus*	0	0	0
Pacific hake	*Merluccius productus*	0	0	0
Pacific tomcod	*Microgadus proximus*	0	0	0
Walleye pollock	*Theragra chalcogramma*	0	0	0
Red brotula	*Brosmophycis marginata*	*	+	*
Pallid eelpout	*Lycodapus mandibularis*	*		*
Shortfin eelpout	*Lycodes brevipes*	+	+	+
Black eelpout	*Lycodes diapterus*	*	+	*
Wattled eelpout	*Lycodes palearis*	*		+
Blackbelly eelpout	*Lycodopsis pacifica*	0	0	0
Tube-snout	*Aulorhynchus flavidus*	*	*	0
Threespine stickleback	*Gasterosteus aculeatus*	*	*	*
Bay pipefish	*Syngnathus griseolineatus*	*	0	0
Shiner perch	*Cymatogaster aggregata*	0	0	0
Striped seaperch	*Embiotoca lateralis*	0	0	0
White seaperch	*Phanerodon furcatus*		+	+
Pile perch	*Rhacochilus vacca*	0	0	0

PROBABLE FISH SPECIES AND ABUNDANCE WITHIN THE STUDY AREA (cont'd)

Common Name	Scientific Name	Central Puget Sound	Port Orchard	Seattle
Pacific barracuda	*Sphyraena argentea*	+		+
Northern ronquil	*Ronquilus jordani*	*	*	0
High cockscomb	*Anoplarchus purpurescens*	+		+
Mosshead warbonnet	*Chirolophis nugator*	+		+
Decorated warbonnet	*Chirolophis polyactocephalus*	+		
Daubed shanny	*Lumpenus maculatus*	+		+
Snake prickleback	*Lumpenus sagitta*	*	0	0
Ribbon prickleback	*Phytichthys chirus*	+		
Bluebarred prickleback	*Plectobranchus evides*	*		*
Whitebarred prickleback	*Poroclinus rothrocki*	+	+	+
Black prickleback	*Xiphister atropurpureus*			+
Penpoint gunnel	*Apodichthys flavidus*	*	+	0
Crescent gunnel	*Pholis laeta*	*	+	*
Saddleback gunnel	*Pholis ornata*	+	+	*
Rockweed gunnel	*Xererpes fucorum*			+
Wolf-eel	*Anarrhichthys ocellatus*	+		+
Quillfish	*Ptilichthys goodei*			+
Giant wrymouth	*Delolepis gigantea*		+	+
Dwarf wrymouth	*Lyconectes aleutensis*	+		
Pacific sand lance	*Ammodytes hexapterus*	*	+	0
Arrow goby	*Clevelandia ios*	+		+
Blackeye goby	*Coryphopterus nicholsi*	+	+	*
Bay goby	*Lepidogobius lepidus*	*	0	+
Pacific bonito	*Sarda chiliensis*	+		+
Pacific pompano	*Peprilus simillimus*		*	+
Ragfish	*Icosteus aenigmaticus*			
Brown rockfish	*Sebastes auriculatus*	+	*	+
Copper rockfish	*Sebastes caurinus*	0	*	0
Darkblotched rockfish	*Sebastes crameri*			+
Splitnose rockfish	*Sebastes diploproa*	+		
Greenstriped rockfish	*Sebastes elongatus*	+		+
Puget Sound rockfish	*Sebastes emphaeus*			+
Yellowtail rockfish	*Sebastes flavidus*			+
Quillback rockfish	*Sebastes maliger*	*	+	*
Black rockfish	*Sebastes melanops*	*	+	*
Tiger rockfish	*Sebastes nigrocinctus*	+		+
Bocaccio	*Sebastes paucispinis*	+	+	+
Canary rockfish	*Sebastes pinniger*			+
Redstripe rockfish	*Sebastes proriger*	+		+
Yelloweye rockfish	*Sebastes ruberrimus*			+
Stripetail rockfish	*Sebastes saxicola*			+
Sharpchin rockfish	*Sebastes zacentrus*			+
Shortspine thornyhead	*Sebastolobus alascanus*	+		
Sablefish	*Anoplopoma fimbria*	0	*	+
Kelp greenling	*Hexagrammos decagrammus*	*	+	*
Rock greenling	*Hexagrammos lagocephalus*	+	+	+
Whitespotted greenling	*Hexagrammos stelleri*	*	0	*
Lingcod	*Ophiodon elongatus*	0	*	*
Painted greenling	*Oxylebius pictus*	+	+	0
Longspine combfish	*Zaniolepis latipinnis*	+	0	+

PROBABLE FISH SPECIES AND ABUNDANCE WITHIN THE STUDY AREA (cont'd

Common Name	Scientific Name	Central Puget Sound	Port Orchard	Seattle
Padded sculpin	*Artedius fenestralis*	*	*	0
Scalyhead sculpin	*Artedius harringtoni*	+	+	*
Smoothhead sculpin	*Artedius lateralis*	+	+	0
Puget Sound sculpin	*Artedius meanyi*	+		
Rosylip sculpin	*Ascelichthys rhodorus*	+		+
Silverspotted sculpin	*Blepsias cirrhosus*	+	+	*
Roughback sculpin	*Chitonotus pugetensis*	0	0	0
Sharpnose sculpin	*Clinocottus acuticeps*	+		*
Calico sculpin	*Clinocottus embryum*	+		
Mosshead sculpin	*Clinocottus globiceps*		+	+
Spinyhead sculpin	*Dasycottus setiger*	+		+
Buffalo sculpin	*Enophrys bison*	*	+	0
Soft sculpin	*Gilbertidia sigalutes*	+	+	+
Red Irish lord	*Hemilepidotus hemilepidotus*	+		*
Northern sculpin	*Icelinus borealis*	+		*
Threadfin sculpin	*Icelinus filamentosus*	+		*
Spotfin sculpin	*Icelinus tenuis*	+	+	0
Longfin sculpin	*Jordania zonope*	+		
Pacific staghorn sculpin	*Leptocottus armatus*	0	0	0
Great sculpin	*Myoxocephalus polyacanthocephalus*	*	0	*
Sailfin sculpin	*Nautichthys oculofasciatus*	*	*	0
Tidepool sculpin	*Oligocottus maculosus*	+		*
Saddleback sculpin	*Oligocottus rimensis*			+
Tadpole sculpin	*Psychrolutes paradoxus*	*		*
Slim sculpin	*Radulinus asprellus*	*	*	0
Grunt sculpin	*Rhamphocottus richardsoni*	+	+	*
Cabezon	*Scorpaenichthys marmoratus*	*	0	*
Manacled sculpin	*Synchirus gilli*			+
Roughspine sculpin	*Triglops macellus*	+	+	+
Ribbed sculpin	*Triglops pingeli*	+	+	+
Northern spearnose poacher	*Agonopsis emmelane*	+	+	*
Sturgeon poacher	*Agonus acipenserinus*	*	0	0
Smooth alligatorfish	*Anoplagonus inermis*			+
Gray starsnout	*Asterotheca alascana*	+	+	+
Spinycheek starsnout	*Asterotheca infraspinata*	+		+
Bigeye poacher	*Asterotheca pentacanthus*	+		+
Blackfin poacher	*Bathyagonus nigripinnis*	+		
Pygmy poacher	*Odontopyxis trispinosa*	0	0	0
Tubenose poacher	*Pallasina barbata*		+	+
Blacktip poacher	*Xeneretmus latifrons*	*	*	0
Bluespotted poacher	*Xeneretmus triacanthus*	+	+	*
Ribbon snailfish	*Liparis cyclopus*	+		+
Marbled snailfish	*Liparis dennyi*	+		+
Tidepool snailfish	*Liparis florae*			+
Slipskin snailfish	*Liparis fucensis*	+		*
Showy snailfish	*Liparis pulchellus*	+	+	+
Tadpole snailfish	*Nectoliparis pelagicus*	+	+	+
Pacific sanddab	*Citharichthys sordidus*	0	*	0
Speckled sanddab	*Citharichthys stigmaens*	0	0	0
Arrowtooth flounder	*Atheresthes stomias*	0	*	0
Petrale sole	*Eopsetta jordani*	*	+	+
Rex sole	*Glyptocephalus zachirus*	0	*	0
Flathead sole	*Hippoglossoides elassodon*	*	0	*
Pacific halibut	*Hippoglossus stenolepis*	+		

PROBABLE FISH SPECIES AND ABUNDANCE WITHIN THE STUDY AREA (cont'd)

Common Name	**Scientific Name**	**Central Puget Sound**	**Port Orchard**	**Seattle**
Butter sole	***Isopsetta isolepis***	+	+	*
Rock sole	***Lepidopsetta bilineata***	0	0	0
Slender sole	***Lyopsetta exilis***	0	0	0
Dover sole	***Microstomus pacificus***	0	*	0
English sole	***Parophrys vetulus***	0	0	0
Starry flounder	***Platichthys stellatus***	*	0	0
C-O sole	***Pleuronichthys coenosus***	0	0	0
Sand sole	***Psettichthys melanostictus***	0	0	0
Ocean sunfish	***Mola mola***	+		+

Source: Reference 1

Legend:

+ = fewer than 10 reports
* = 10 to 49 reports
0 = 50 or more reports

APPENDIX D-6

INTERTIDAL BENTHIC SAMPLING RESULTS

As a result of Phase II studies on the marine biological environment, the following sampling results are presented:

Site C - North Point Orchard, 24 July 1975

Site C - North Point Orchard, 12 August 1975

SITE C - NORTH POINT ORCHARD, 24 JULY 1975

STATIONS:	L1	C1A	C1B	R1	L2	C2A	C2B	R2	L3	C3A	C3B	R3
VEGETATION PRESENT:												
Ceramium californicum									P			
Enteromorpha compressa						P		P				
Enteromorpha intestinalis											P	P
Enteromorpha linza						P						P
Ulva lactuca												P
Zostera marina											P	P
MOLLUSCA - PELECYPODA:												
Clinocardium nuttallii										1	1	
Macoma balthica					2	1	2	3		4	11	1
Macoma nasuta					7	6	3	2	2	2	3	1
Mya arenaria	1											
Protothaca staminea	3		1							1	1	1
Venerupis japonica	8	2				1						
Venerupis tennerima									4	3	3	2
MOLLUSCA - GASTROPODA:												
Lacuna vincta												2
CRUSTACEA:												
Brachyura												P
Caprella **sp.**							1				1	
Corophium **sp.**						8	3	1	1	6	1	6
Gammaridae sp. #1					1							
Gammaridae sp. #2						3	2					
Gammaridae sp. #3												4
Hemigrapsus nudus		6	2			2	1					
Pinnixa **sp.**									38		1	
Scleroplax granulata							1					
Upogebia pugettensis	1											

SITE C - NORTH POINT ORCHARD, 24 JULY 1975 (Continued)

STATIONS:	L1	C1A	C1B	R1	L2	C2A	C2B	R2	L3	C3A	C3B	R3
POLYCHAETA												
Capitellidae					21	14	22	5	1	3		1
Glyceridae	1		1	1								
Maldanidae									2	3		
Nepthyidae						2		1	3	2	2	1
Nereidae		3		2	1		1	1	2		1	1
Orbinidae									1	22		
Owenidae								1	26		36	46
Sabellidae										4		
Spiochaetopterns costarum							2					
Terebellidae									2	3	3	3
NEMERTEA												
Cerebratulus californiensis							1			1		
Tubularia pellicudas									17	14	7	9
PHORONIDA					5	1						

SITE C - NORTH POINT ORCHARD, 12 AUGUST 1975

STATIONS:	1	2	3	4	5	6	7	8
MOLLUSCA-PELECYPODA								
Acila castrensis		3	7	9	6	6	3	11
Compsomyax subdiaphana							1	
Macoma balthica								1
M. nasuta						1		1
Solenidae	F							
Yoldia limatula							1	
MOLLUSCA-GASTROPODA								
Nassarius mendicus	4							
Trichotropis cancellata			1					
CRUSTACEA								
Loxorhynchus crispatus					1			

SITE C - NORTH POINT ORCHARD, 12 AUGUST 1975 (Continued)

STATIONS:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
POLYCHAETA								
Ampharetidae	1	1						
Axiothella rubrocinta	3	2						
Glyceridae	1							
Phyllochaetopterus prolifica			12	9	20	4	13	12
Sabellidae			1					
Spiochaetopterus costarum	3		2					
Terebellidae		1						
ECHINODERMATA								
Amphiodia occidentalis	9	5	14	12	16	8	12	13
CNIDARIA								
Hydrozoa	P		P	P	P	P	P	P
Ptilosarcus gurneyi						1		
NEMERTEA								
Cerebratulus californiensis	1							
CHORDATA								
***Styela* sp.**					14			
BRYOZOA								
Membranipora membranacea			P					
Unidentified sp. #1			P	P	P		P	
SIPUNCULA								
Unidentified sp. #1	5						1	
Unidentified sp. #2			1					
Unidentified sp. #3					1			

APPENDIX D-7

BEACH SEINE RESULTS

FISH	SITE F DYES INLET 8/11/75		SITE B POINT MONROE 8/13/75		SITE C N. Port Orchard 8/14/75	
	Set #1	Set #2	Set #1	Set #2	Set #1	Set #2
Ratfish *(Hydrolagus collei)*			1			
Herring *(Clupea harengus pallasi)*			4	6		
Chum salmon *(Oncorhynchus keta)*	1		17	43		
Searun cutthroat trout *(Salmo clarkii clarkii)*	2	1				
Smelt *(Hypomesus pretiosus pretiosus)*			3	2		
Pacific cod *(Gadus macrocephalus)*		1				
Pacific tomcod *(Microgadus proximus)*				1		
Three-spined stickleback *(Gasterosteus aculeatus)*				1		
Shiner seaperch *(Cymatogaster aggregata)*	3	15	16	49	26	10
Striped seaperch *(Embiotoca lateralis)*	49	64	12	95		
Pile seaperch *(Rhacochilus vacca)*			3	3		
Staghorn sculpin *(Leptocottus armatus)*	28	56		5	24	28
Sole (family: Pleuronectidae)	9	2	1		1	
Starry flounder *(Platicthys stellatus)*	13	7			3	
INVERTEBRATES						
Jellyfish *(Aurelia aurita)*					6	8
Northern kelp crab *(Pugettia producta)*		1				
Dungeness crab *(Cancer magister)*	38	122	1		1	1
Rock crab *(Cancer productus)*				1		

Source: "Biological Baseline Studies and Impact Assessment, Central Kitsap Facilities Plan," URS Company, Bainbridge Island, Washington, September 1975.

APPENDIX E

BIOLOGICAL TERRESTRIAL ENVIRONMENT

BIOTIC COMMUNITIES

Coniferous Forest

The Coniferous Forest unit on the Kitsap Peninsula is dominated by Douglas-fir, primarily because of climate and human activity in Puget Sound. Although western hemlock is considered to be the climax species in this coastal vegetation zone, Dougles-fir is better adapted to local climatic conditions such as less precipitation, hotter summers (and thus more evaporative stress) and a shorter growing season (because of colder winters). Additionally, Douglas-fir is a pioneer species, becoming established in open conditions after logging, fire, land-clearing or other land disturbances. Other major tree species found within this unit are western hemlock, western redcedar, western white pine and red alder. Salal, ocean spray and evergreen huckleberry are among the major shrubs, with shade-tolerant herbs and ferns comprising the understory. Animal life in this community is abundant, harboring many nut- and insect-eating birds such as chickadees, nuthatches, creepers and jays. Larger birds include the blue and ruffed grouse and predators such as Cooper's hawk and screech owls. Mammals include several species that occur in more than one habitat, such as the black bear, coyote, raccoon and red-backed vole.

Broadleaf Forest

The growth and development of deciduous hardwood forests is generally limited by climatic conditions. The mild Washington coastal winters enable coniferous species to continue tissue growth at a time when the deciduous trees are dormant. The relatively dry summers are also unfavorable to broadleaf trees, which must channel large amounts of energy and nutrients toward foliage production at a time when evaporative stress is high. Consequently, within Kitsap County, deciduous trees and shrubs are more common in lowland areas which retain higher soil moisture. The impact of human activities over the years has stimulated and broadened the range of the Broadleaf Forest. Fast-growing deciduous vegetation invades and successfully competes with conifers in recently cleared areas, second-growth zones and urban and auto traffic areas. Deciduous vegetation is also aided and stimulated by human activities such as irrigation and on-site disposal systems.

Red alder is a pioneer species on moist, disturbed land, and bigleaf maple is a major component of the Broadleaf Forest unit. Other tree species include cascara, Pacific willow, madrona, western hemlock and Douglas-fir. Understory species are salmonberry, blackcap, red elderberry and sword fern, as well as common herbaceous species.

The Broadleaf Forest habitat generally has a lower tree canopy and more intermittent open areas than does the Coniferous Forest. The thicker understory of flowering vines, berries and shrubs in the Broadleaf Forest is attractive to many fruit- and seed-eating birds, such as mourning doves, juncoes, migratory warblers, thrushes and sparrows. In addition to the larger mammals mentioned in the discussion of the Coniferous Forest, smaller fruit- and seed-eating mammals such as striped skunk, cottontail rabbit, townsend chipmunk and deer mouse are prevalent. Under rocks and rotting logs are found several salamander species: rough-skinned newt, northern alligator lizard and northwestern garter snake.

Mixed Coniferous/Broadleaf Forest

Much of the forested land within the study area contains a mixture of the major coniferous and broadleaf species found in each of those respective units. Soil moisture and human activity are the primary factors allowing the establishment of hardwoods among conifers. Major tree species are Douglas-fir, western redcedar, bigleaf maple, Pacific dogwood, red alder and western hemlock. This unit contains some open upland areas that are being invaded by Scotch broom, red alder, willow, madrona and Douglas-fir. The understory is lush, containing thick growths of salal, red elderberry, Indian plum, swamp gooseberry, blackcap, salmonberry, sword fern and common herbaceous species. The fire potential in this unit is extremely high since in many areas there is a continuous layer of fuel from ground to canopy.

Riparian vegetation along perennial creeks and watercourses can be considered a sub-unit within the Mixed Coniferous-Broadleaf Forest. This vegetation has a continuous supply of water that supports thick vegetative growth and moisture-loving species. Major tree species found in riparian zones are western redcedar, vine maple, red alder, bigleaf maple and western hemlock. Dense growths of shrubs and herbs, such as devil's club, blackcap, thimbleberry, stinging nettle, skunk cabbage, sword fern and bracken fern, are found along with other characteristic species. Birds particularly favoring the riparian habitat are mourning dove, olive-sided and Traill's flycatchers, Bewick wren, all vireos, song sparrow and many warblers. Amphibians such as boreal toad, rough-skinned newt and salamander, which occur seasonally in many habitats, all return to the water habitat to mate and spawn. Mammals frequenting the riparian habitat include the raccoon, woodrat, deer mouse, all shrews and most bats.

Pasture/Meadow

The pastures and meadows within the study area are fairly open areas primarily under agricultural use. Woody vegetation scattered throughout and on drier margins includes red alder, willow, Douglas-fir and western white pine. The meadow species include a variety of grasses, salmonberry, blackcap, ox-eye daisy, sword fern, rushes, self-heal, buttercup and other common species. Land areas utilized as rural residences and developments are also included within this unit. Grazing, agriculture and residential activity serve to check the invasion of the drier areas by brush and woody species.

The Pasture/Meadow habitat generally is favored by seed-eating birds such as western meadowlark, mourning dove, Brewer's blackbird and savannah sparrow. Secretive and burrowing mammals such as white-footed mouse, Pacific jumping mouse and pocket gopher would be common. Varying with the degree of moisture, the boreal toad and garter snake are also found.

Freshwater Marsh

An upland marsh area, as reported in Reference 1, may be found along a broad swale between ridges in the northeastern section of the study area. The marsh is probably associated with the Alderwood soil series, which is characterized as a soil with a cemented hardpan in the lower part of the soil profile. This hardpan is impervious, preventing penetration by plant roots and water. Since it is an area of subdued gradient, a temporary or perched water table exists, to create marsh conditions. This wet lowland area supports a variety of grasses, rushes, cattails, horsetails, skunk cabbage and watercress, with occasional red alder, willow and Douglas-fir in the drier areas.

Marsh habitat animals may include red-winged blackbird, killdeer, barn and cliff swallows, fox and song sparrows, vagrant and other water shrews, raccoon, Pacific treefrog and red-legged frog.

Residential

The area in the vicinity of Silverdale is characterized as residential and/or urban. Vegetation within this unit consists of native and exotic species growing in lawns, gardens and orchards and along roadsides and other locales. Common animals include the robin, mockingbird, house sparrow, house finch, barn and cliff swallows, boreal toad, garter snake and occasional raccoon and black-tailed deer.

Marine Shoreline

Sand-gravel-cobble beaches are typical of most shorelines in Puget Sound. The extend of the beach area is dependent upon the amount of beach drift material, current strength and degree of wave action. Minimal or no back beach areas on eroded shores occur along segments northwest of Tracyton. These shorelines have steep slopes and bluffs resulting from a constant undercutting wave action. Vegetation may hang over the water, or slides may occur that expose the underlying soil. On the other hand, accreted shorelines with moderate to extensive back beach areas are divided into two zones: the upper zone, generally consisting of heavier materials, with moderate to steep slope; and the lower zone, generally consisting of lighter materials and a shallow slope.

Shore vegetation found on the beach and upper beach areas is exposed to the air but requires a saline water environment. Pickleweed, cord grass, cat's ear, rush and bulrush are common in the shore area. These beach plants are often found on protected accreting shorelines which provide a gravel back beach area of sufficient width for the plants to survive and germinate. Cord grass, rush and pickleweed help to stabilize accreted shorelines and act as a barrier system against severe storms which erode shorelines. This shore vegetation also provides food and shelter for migratory waterfowl, shorebirds and other shoreside animals, as well as for juvenile fish (Reference 22).

The predominant wildlife covers a wide range of shorebirds and waterfowl. Resident species include killdeer; great blue heron; sandpiper; yellowleg; dabbling ducks such as mallards, green-winged teal, American widgeon; diving ducks such as bufflehead, goldeneye and red-breasted merganser; and various gulls. The primary food items for these birds are the associations of small crustaceans, worms and molluscs in the interstices of gravel, cobble and sand.

APPENDIX F

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

WASHINGTON ADMINISTRATIVE CODE (WAC)
CHAPTER 173-201 WAC

WATER QUALITY STANDARDS

Effective July 19, 1973 (Docket 73-4)
Amended Effective August 20, 1973 (Docket 73-22)

WAC	173-201-010	Purpose
	173-201-020	Water Use and Quality Criteria
	173-201-030	-------, General Water Use and Criteria Classes
	173-201-040	-------, General Considerations
	173-201-050	-------, Characteristic Uses to be Protected
	173-201-060	Water Course Classification
	173-201-070	-------, General Classifications
AMD	173-201-080	-------, Specific Classifications
	173-201-090	Achievement Considerations
	173-201-100	-------, Implementation
	173-201-110	-------, Surveillance
	173-201-120	-------, Enforcement
	173-201-130	Definitions
	173-201-140	Miscellaneous

NEW WAC 173-201-010 PURPOSE. The purpose of this chapter is to establish water quality standards for waters of the State of Washington pursuant to the provisions of chapter 90.48 RCW and the policies and purposes thereof.

NEW WAC 173-201-020 WATER USE AND QUALITY CRITERIA. The water use and quality criteria set forth in sections 030 through 050 are established in conformance with present and potential water uses of said waters and in consideration of the natural water quality potential and limitations of the same. Nonetheless, the dynamic nature of the process is also recognized. Hence, frequent review of these uses and criteria are anticipated and revisions will be undertaken as additional information is developed.

NEW WAC 173-201-030 -------GENERAL WATER USE AND CRITERIA CLASSES. The following criteria shall be applicable to the various classes of waters in the State of Washington:

(1) Class AA (Extraordinary).

(a) General characteristic. Water quality of this class shall markedly and uniformly exceed the requirements for all or substantially all uses.

(b) Characteristic uses. Characteristic uses shall include, but are not limited to the following:

(i) Water supply (domestic, industrial, agricultural).

(ii) Wildlife habitat, stock watering.

(iii) General recreation and aesthetic enjoyment (picnicking, hiking, fishing, swimming, skiing, and boating).

(iv) General marine recreation and navigation.

(v) Fish and shellfish reproduction, rearing, and harvest.

(c) Water quality criteria.

(i) Total coliform organisms shall not exceed median values of 50 (fresh water) or 70 (marine water) with less than 10% of samples exceeding 230 when associated with any fecal source.

(ii) Dissolved oxygen shall exceed 9.5 mg/l (fresh water) or 7.0 mg/l (marine water).

(iii) Total dissolved gas - the concentration of total dissolved gas shall not exceed 110% of saturation at any point of sample collection.

(iv) Temperature - water temperatures shall not exceed 60° F. (fresh water) or 55° F. (marine water) due in part to measurable (0.5° F.) increases resulting from human activities; $t = 75/(T-22)$ (fresh water) or $t = 24/(T-39)$ (marine water); for purposes hereof "t" represents the permissive increase and "T" represents the water temperature due to all causes combined.

(v) pH shall be within the range of 6.5 to 8.5 (fresh water) or 7.0 to 8.5 (marine water) with an induced variation of less than 0.1 units.

(vi) Turbidity shall not exceed 5 JTU natural conditions.

(vii) Toxic, radioactive, or deleterious material concentrations shall be less than those which may affect public health, the natural aquatic environment, or the desirability of the water for any usage.

(viii) Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch or taste.

(2) Class A (Excellent).

(a) General characteristic. Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

(b) Characteristic uses. Characteristic uses shall include, but are not limited to, the following:

(i) Water supply (domestic, industrial, agricultural).

(ii) Wildlife habitat, stock watering.

(iii) General recreation and aesthetic enjoyment (picnicking, hiking, fishing, swimming, skiing and boating).

(iv) Commerce and navigation.

(v) Fish and shellfish reproduction, rearing and harvest.

(c) Water quality criteria.

(i) Total coliform organisms shall not exceed median value of 240 (fresh water) with less than 20% of samples exceeding 1,000 when associated with any fecal sources or 70 (marine water) with less than 10% of samples exceeding 230 when associated with any fecal sources.

(ii) Dissolved oxygen shall exceed 8.0 mg/l (fresh water) or 6.0 mg/l (marine water).

(iii) Total dissolved gas - the concentration of total dissolved gas shall not exceed 110% of saturation at any point of sample collection.

(iv) Temperature - water temperatures shall not exceed 65° F. (fresh water) or 61° F. (marine water) due in part to measurable (0.5° F.) increases resulting from human activities; nor shall such temperature increases, at any time, exceed $t = 90/(T-19)$ (fresh water) or $t = 40/(T-35)$ (marine water); for purposes hereof "t" represents the permissive increase and "T" represents the water temperature due to all causes combined.

(v) pH shall be within the range of 6.5 to 8.5 (fresh water) or 7.0 to 8.5 (marine water) with an induced variation of less than 0.25 units.

(vi) Turbidity shall not exceed 5 JTU over natural conditions.

(vii) Toxic, radioactive, or deleterious material concentrations shall be below those of public health significance, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect any water use.

(viii) Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

(3) Class B (Good).

(a) General characteristic. Water quality of this class shall meet or exceed the requirements for most uses.

(b) Characteristic uses. Characteristic uses shall include, but are not limited to, the following:

(i) Industrial and agricultural water supply.

(ii) Fishery and wildlife habitat.

(iii) General recreation and aesthetic enjoyment (picnicking, hiking, fishing, and boating).

(iv) Stock watering.

(v) Commerce and navigation.

(vi) Shellfish reproduction and rearing, and crustacea (crabs, shrimp, etc.) harvest.

(c) Water quality criteria.

(i) Total coliform organisms shall not exceed median values of 1,000 with less than 10% of samples exceeding 2,400 when associated with any fecal source.

(ii) Dissolved oxygen shall exceed 6.5 mg/l (fresh water) or 5.0 mg/l (marine water), or 70% saturation, whichever is greater.

(iii) Total dissolved gas - the concentration of total dissolved gas shall not exceed 110% of saturation at any point of sample collection.

(iv) Temperature - water temperatures shall not exceed 70° F. (fresh water) or 66° F. (marine water) due in part to measurable (0.5° F.) increases resulting from human activities; nor shall such temperature increases, at any time, exceed $t = 110/(T-15)$ (fresh water) or $t = 52/(T-32)$ (marine water); for purposes hereof "t" represents the permissive increase and "T" represents the water temperature due to all causes combined.

(v) pH shall be within the range of 6.5 to 8.5 (fresh water) or 7.0 to 8.5 (marine water) with an induced variation of less than 0.5 units.

(vi) Turbidity shall not exceed 10 JTU over natural conditions.

(vii) Toxic, radioactive, or deleterious material concentrations shall be below those which adversely affect public health during the exercise of characteristic usages, or which may cause acute or chronic toxic conditions to the aquatic biota, or which may adversely affect characteristic water uses.

(viii) Aesthetic values shall not be reduced by dissolved, suspended, floating or submerged matter not attributable to natural causes, so as to affect water usage or taint the flesh of edible species.

(4) Class C (Fair).

(a) General characteristic. Water quality of this class shall meet or exceed the requirements of selected and essential uses.

(b) Characteristic uses. Characteristic uses shall include, but are not limited to, the following:

(i) Cooling water.

(ii) Commerce and navigation.

(iii) Fish passage.

(iv) Boating.

(c) Water quality criteria.

(i) Total coliform organisms shall not exceed median values of 1,000 when associated with any fecal source.

(ii) Dissolved oxygen shall exceed 5.0 mg/l (fresh water) or 4.0 mg/l (marine water), or 50% saturation, whichever is greater.

(iii) Total dissolved gas - the concentration of total dissolved gas shall not exceed 110% saturation at any point of sample collection.

(iv) Temperature - water temperatures shall not exceed 75° F. (fresh water) or 72° F. (marine water) due in part to measurable (0.5° F.) increases resulting from human activities; nor shall such temperature increases, at any time, exceed $t = 125/(T-12)$ (fresh water) or $t = 64/(T-29)$ (marine water); for purposes hereof "t" represents the permissive increase and "T" represents the water temperatures due to all causes combined.

(v) pH shall be within the range of 6.5 to 9.0 (fresh water) or 7.0 to 9.0 (marine water) with an induced variation of less than 0.5 units.

(vi) Turbidity shall not exceed 10 JTU over natural conditions.

(vii) Toxic, radioactive or deleterious material concentrations shall be below those which adversely affect public health during the exercise of characteristic usages, or which may cause acute or chronic toxic conditions to the aquatic biota, or which adversely affect characteristic water uses.

(viii) Aesthetic values shall not be interfered with by the presence of obnoxious wastes, slimes, or aquatic growths or by materials which will taint the flesh of edible species.

(5) Lake Class.

(a) General characteristic. Water quality of this class shall meet or exceed the requirements for all or substantially all uses.

(b) Characteristic uses. Characteristic uses for waters of this class shall include, but are not limited to, the following:

(i) Water supply (domestic, industrial, agricultural).

(ii) Wildlife habitat, stock watering.

(iii) General recreation and aesthetic enjoyment (picnicking, hiking, fishing, swimming, skiing, and boating).

(iv) Fish and shellfish reproduction, rearing, and harvest.

(c) Water quality criteria.

(i) Total coliform organisms shall not exceed median values of 240 with less than 20% of samples exceeding 1,000 when associated with any fecal source.

(ii) Dissolved oxygen - no measurable decrease from natural conditions.

(iii) Total dissolved gas - the concentration of total dissolved gas shall not exceed 110% of saturation at any point of sample collection.

(iv) Temperature - no measurable change from natural conditions.

(v) pH - no measurable change from natural conditions.

(vi) Turbidity shall not exceed 5 JTU over natural conditions.

(vii) Toxic, radioactive, or deleterious material concentrations shall be less than those which may affect public health, the natural aquatic environment, or the desirability of the water for any usage.

(viii) Aesthetic values shall not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste.

NEW WAC 173-201-040 -------GENERAL CONSIDERATIONS. The following general guidelines shall be applicable to the water quality criteria and classifications set forth in WAC 173-201-020 through WAC 173-201-080 hereof:

(1) At the boundary between waters of different classifications, the water quality criteria for the higher classification shall prevail.

(2) In brackish waters of estuaries, where the fresh and marine water quality criteria differ within the same classification, the criteria shall be interpolated on the basis of salinity except that the marine water quality criteria shall apply for dissolved oxygen when the salinity is one (1) part per thousand or greater and for total coliform organisms when the salinity is ten (10) parts per thousand or greater.

(3) Except for the aesthetic values and acute biological shock conditions the water quality criteria herein established shall not apply:

(a) Within immediate mixing zones of a very limited size adjacent to or surrounding a wastewater discharge;

(b) In the case of total dissolved gas, when the stream flow exceeds the 10-year, 7-day average flood;

(c) In a manner contrary to the applicable conditions of a valid discharge permit.

(4) The total area and/or volume of a receiving water assigned to a mixing zone shall be as described in a valid discharge permit and limited to that which will: (a) not interfere with biological communities or populations of important species to a degree which is damaging to the ecosystem; (b) not diminish other beneficial uses disproportionately.

(5) The criteria established in WAC 173-201-030 through WAC 173-201-050 for any of the various classifications of this regulation may be modified by the director for limited periods when receiving waters fall below their assigned water quality criteria due to natural causes or if in the opinion of the director the protection of the overall public interest and welfare requires such modification.

(6) Except where the director determines that overriding considerations of the public interest will be served, wherever receiving waters of a classified area are of a higher quality than the criteria assigned for said area, the existing water quality shall constitute water quality criteria.

(7) Whenever the natural conditions are of a lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria.

(8) Due consideration will be given to the precision and accuracy of the sampling and analytical methods used in the application of the criteria.

(9) The analytical testing methods for these criteria shall be in accordance with the most recent editions of Standard Methods for the Examination of Water and Waste Water, and Methods for Chemical Analysis of Water and Wastes (EPA 16020), and other or superceding methods published or approved by the department following consultation with adjacent states and concurrence of the Environmental Protection Agency.

(10) Deleterious concentrations of radioactive materials for all classes shall be as determined by the lowest practicable concentration attainable and in no case exceed: (a) 1/3 of the values listed in WAC 402-24-220 (Column 2, Table II, Appendix A, Rules and Regulations for Radiation Protection), or (b) the 1962 U.S. Public Health Service Drinking Water Standards as revised, or (c) the Radiation Protection Guides for maximum exposure of critical human organs recommended by the former Federal Radiation Council in the case of foodstuffs harvested from waters for human consumption.

(11) Deleterious concentrations of toxic, or other nonradioactive materials shall be as determined by the department

in consideration of the Report of the National Technical Advisory Committee on Water Quality Criteria, 1968, and as revised, and/or other relevant information.

NEW WAC 173-201-050 -------CHARACTERISTIC USES TO BE PROTECTED. The following is a noninclusive list of uses to be protected by the various classifications in fresh and marine waters:

USES	WATERCOURSE CLASSIFICATION				
	LAKE	AA	A	B	C
FISHERIES					
Salmonid					
Migration	F	F M	F M	F M	F M
Rearing	F	F M	F M	F M	
Spawning	F	F	F		
Warm Water Game Fish					
Rearing	F	F	F	F	
Spawning	F	F	F	F	
Other Food Fish	F	F M	F M	F M	
Commercial Fishing	F	F M	F M	F M	
Shellfish	F	M	M	M	
WILDLIFE	F	F M	F M	F M	
RECREATION					
Water Contact	F	F M	F M		
Boating and Fishing	F	F M	F M	F M	F M
Environmental Aesthetics	F	F M	F M	F M	F M
WATER SUPPLY					
Domestic	F	F	F		
Industrial	F	F M	F M	F M	F M
Agricultural	F	F	F	F	F
NAVIGATION	F	F M	F M	F M	F M
LOG STORAGE & RAFTING	F	F M	F M	F M	F M
HYDRO-POWER	F	F	F	F	F

NEW WAC 173-201-060 WATER COURSE CLASSIFICATION. The various waters of the State of Washington are classified as follows, except as noted herein:

NEW WAC 173-201-070 -------GENERAL CLASSIFICATIONS. (1) All surface waters lying within the mountainous regions of the state assigned to national parks, national forests, and/or wilderness areas, are hereby designated Class AA or Lake Class.

(2) All lakes and their feeder streams within the state are hereby designated Lake Class and Class AA respectively.

(3) All reservoirs with a mean detention time of greater than 15 days are classified Lake Class.

(4) All reservoirs with a mean detention time of 15 days or less are classified the same as the river section in which they are located.

(5) All reservoirs established on preexisting lakes are classified as Lake Class.

(6) All other waters within the state are hereby designated Class A.

AMD WAC 173-201-080 -------SPECIFIC CLASSIFICATIONS. Various specific waters of the State of Washington are classified as follows:

(1) Dyes and Sinclair Inlets west of longitude 122°37' W. Special conditions - Sinclair Inlet and Port Washington Narrows West of longitude 122°37' W. and south of latitude 47°35'20" N. Total coliform organisms - shall not exceed median values of 1,000 with less than 20% of samples exceeding 2,400 when associated with any fecal source.	Class A
(2) Strait of Juan de Fuca and Puget Sound through Admiralty Inlet and South Puget Sound, South and West to longitude 122°52' 30" W. (Brisco Point) and longitude 122°51'W. (northern tip of Hartstene Island), Hood Canal, Possession Sound south of latitude 47°57' N. (Mukilteo) and all North Puget Sound west of longitude 122°39' (Whidbey, Fidalgo, Guemes and Lummi Island) except as otherwise noted.	Class AA

NEW WAC 173-201-090 ACHIEVEMENT CONSIDERATIONS. To fully achieve and maintain the foregoing water quality in the State of Washington, it is the intent of the department of ecology to apply the various implementation and enforcement authorities at its disposal including the development and implementation of the continuing planning process required under section 303(e) of the Federal Water Pollution Control Act Amendments of 1972, and applicable federal regulations thereunder. It is also the intent that cognizance will be taken of the need for information as contemplated under section 304 of the federal act with emphasis on silviculture and agriculture, and for participation in cooperative programs with other state agencies and private groups with respect to the management of related problems. The Washington department of ecology's planned program for water pollution control will be defined and revised annually in accordance with section 106 of said federal act and regulations. Further, it shall be required that all activities which discharge wastes into waters within the state or otherwise adversely affect the quality of said waters be in compliance with the wastes treatment and discharge provisions of state or federal law.

NEW WAC 173-201-100 -------IMPLEMENTATION. (1) Discharges from Municipal, Commercial and Industrial Operations. The primary means to be utilized for controlling municipal, commercial and industrial waste discharge shall be through the issuance of waste disposal permits as provided for in RCW 90.48.160 and following.

(2) Miscellaneous Waste Discharge or Water Quality Effect Sources. The director shall, through the issuance of regulatory permits, directives, and orders as are appropriate, control miscellaneous waste discharges and water quality effect sources not covered by subsection (1) hereof. It is noted that from time to time certain short-term activities which are deemed necessary to accommodate essential activities or to otherwise protect the public interest may be specially authorized by the director under such conditions as the director may prescribe even though such activities may result in a reduction of water quality conditions below those criteria and classifications established by this regulation.

NEW WAC 173-201-110 -------SURVEILLANCE. A continuing surveillance program to ascertain whether the regulations, waste disposal permits, order, and directives promulgated and/or issued by the department are being complied with, will be conducted by the department staff as follows:

(1) Inspecting of treatment and control facilities.

(2) Monitoring and reporting of waste discharge characteristics.

(3) Monitoring of receiving water quality.

NEW WAC 173-201-120 -------ENFORCEMENT. To insure that the provisions of chapter 90.48 RCW, the standards for water quality promulgated herein, the terms of waste disposal permits, and other orders and directives of the department are fully complied with, the following enforcement tools will be relied upon by the department, in cooperation with the attorney general as it deems appropriate:

(1) Issuance of regulatory notifications, orders, and directives as provided for in RCW 90.48.120. Under this section, whenever it is the department's opinion that a person is polluting or is about to pollute the state's waters, the department shall notify said person of the department's determination. Within thirty days said person shall notify the department of the action he has taken with regard to said notification, whereupon the department shall issue such order or directive as it deems appropriate. Thereafter any person feeling aggrieved may request a department hearing relating to said order or directive; the same being conducted in accordance with chapter 43.21B RCW, and chapter 371-08 WAC. Any party to the hearing may request review of the department's order issued after said hearing in a superior court of this state, if the hearing is informal, or to the court of appeals if the hearing is formal.

(2) Initiation of actions requesting injunctive or other appropriate relief in the various courts of the state as provided for in RCW 90.48.037.

(3) Levying of civil penalties as provided for in RCW 90.48.144. Under this section, the director of the department may levy a civil penalty up to five thousand dollars per day against a person who violates the terms of a waste discharge permit, or who discharges without such a permit when the same is required, or violates the provisions of RCW 90.48.080. If the amount of the penalty, which is subject to mitigation or remission by the department, is not paid within fifteen days after receipt of said notice, the attorney general, upon request of the director, shall bring an action in superior court to recover the same.

(4) Initiation of a criminal proceeding by the appropriate county prosecutor, as provided for in RCW 90.48.140.

(5) Issuance of regulatory orders or directives as provided for in RCW 90.48.240.

NEW WAC 173-201-130 DEFINITIONS. For the purpose of this chapter, the following definitions are applicable:

(1) "Natural condition" means the resulting water quality in the absence of any measurable pollutional effect due to human activities excepting only the effects of depth, volume, surface area or shoreline configuration resulting from the legal physical alteration of a water body.

(2) "Acute biological shock condition" means that dose or circumstance which has been demonstrated by field or laboratory observations to directly result in mortalities of food, game, or commercial fish species.

(3) "Permit" means a document issued for a wastes source specifying the wastes treatment and control requirements and wastes discharge conditions.

(4) "Total coliform organisms" mean total coliform organisms per 100 milliliters.

(5) "Temperature" means temperature expressed in degrees Fahrenheit.

(6) "pH" means the negative logarithm of the hydrogen-ion concentration.

(7) "Turbidity" means the optical property of a sample demonstrating the scattering and absorption of light caused by suspended material as expressed in Jackson Turbidity Units (JTU).

(8) "Mean detention time" means the time obtained by dividing a reservoir's mean annual minimum total storage by the 30-day ten-year low-flow from the reservoir.

NEW WAC 173-201-140 MISCELLANEOUS. (1) The water quality criteria adopted in this chapter shall be the sole criteria for the various waters in the State of Washington.

(2) The criteria, classifications and achievement considerations established by this chapter shall be reviewed from time to time by the department to insure that the quality of the waters of the state may be enhanced wherever possible through appropriate modifications of this chapter.

(3) These rules contemplate and it is the specific intent of the department of ecology to evaluate the watercourse classifications under WAC 173-201-060 through 080 hereof in the near future, with special emphasis placed on those waters constituting reaches of streams in nonurban areas, and, if deemed appropriate, initiate rule-making proceedings by September 1, 1973, as to any needed changes in classification. Additionally, the department shall, in light of concerns expressed

both for high water quality and for the carrying on of activities on land which have an effect on certain water reaches, continue with expedition to examine all waters of the state, the needs for the protection of the same and related concerns, and if after such evaluation, it appears appropriate, initiate rule-making procedures to modify this chapter.

(4) Chapters 372-12 and 372-64 WAC are repealed.

APPENDIX G

ARCHAEOLOGICAL RECONNAISSANCE IN THE CLEAR CREEK DRAINAGE EASTERN KITSAP PENINSULA

by

Charlotte L. Benson

prepared for URS/Hill, Ingman, Chase & Co.
and the Kitsap County Commissioners
in support of the environmental impact statement
for the Brownsville – Silverdale – Meadowdale
Sewerage Facilities and the Clear Creek
Sewer Interceptor System

University of Washington

Office of Public Archaeology

Reconnaissance Reports No. 3

Seattle

February 3, 1975

INTRODUCTION

In anticipation of the proposed construction of sewage treatment and transmission facilities in the Brownsville – Silverdale vicinity (Kitsap County, Washington), an archaeological survey was conducted to determine the nature and extent of cultural resources which might be adversely affected by construction activities. The scope of this investigation was developed through conversations between Messrs. Larry Sullivan and Steve Fusco, of URS/Hill, Ingman, Chase & Co., and Mr. Jerry Jermann of the University of Washington's Office of Public Archaeology; formal contractual arrangemnets between these two parties being initiated on December 1, 1975.

Installation of the proposed sewer system involves the construction of sewage treatment facilities, trunk lines, and associated pump stations in an area which involves the lower Clear Creek Valley north of Silverdale, the north beach of Dye's Inlet, the north side of Bucklin Hill Road between Silverdale and Brownsville, and the waterfront in the vicinity of the Brownsville Marina on Burke Bay. A preliminary review of both the National Register of Historic Places and the University of Washington's Site Survey Records for Kitsap County revealed an absence of any *known* sites of archaeological, historical, or architectural significance within the immediate project area. However, further documentation was deemed necessary, as this area had not been the subject of any prior systematic cultural resource inventory.

In mid-December, 1974, the area to be directly impacted by the proposed construction was intensively scrutinized by a reconnaissance archaeologist for evidence of any significant cultural resources. The resulting survey of all available horizontal and vertical surface exposures resulted in the locating of but a single archaeological site (formally designated as site 45-Kp-17), a shell midden near the Brownsville Marina on Burke Bay. Modern use of this area (e.g. road construction, historic occupation, and dredging operations) has resulted in the removal of so much cultural material from the site that its potential to contribute significantly to the area's prehistory has been considerably diminished. Based upon these findings, further archaeological work is deemed unnecessary at this time, both in the immediate vicinity of the shell heap and elsewhere in the surveyed area.

PHYSIOGRAPHY

The Kitsap Peninsula is part of the glacially-scoured Puget Trough, a large partially-submerged depression owing much of its present topography and geology to an extension of the Cordilleran ice sheet into northwestern Washington during the late Pleistocene. In particular, the large moraine of which Kitsap Peninsula is a part slopes towards the Sound, containing many lakes and poorly-drained depressions underlain by glacial drift.

The Kitsap Peninsula has a long irregular coastline serrated by bays and inlets; the present survey area lying between two such features, Burke Bay and Dye's Inlet (see Fig. 1). Overall relief in the area is characterized by rolling uplands and flat to slightly depressed areas. The latter is exemplified in the project area by the Clear Creek Valley (see Fig. 2).

. Clear Creek is one of the few perennial streams on the peninsula, where a prominent feature of the drainage system is a lack of developed lateral or tributary watercourses. Clear Creek is fed by several short intermittent tributaries flowing down the gentle valley slopes.

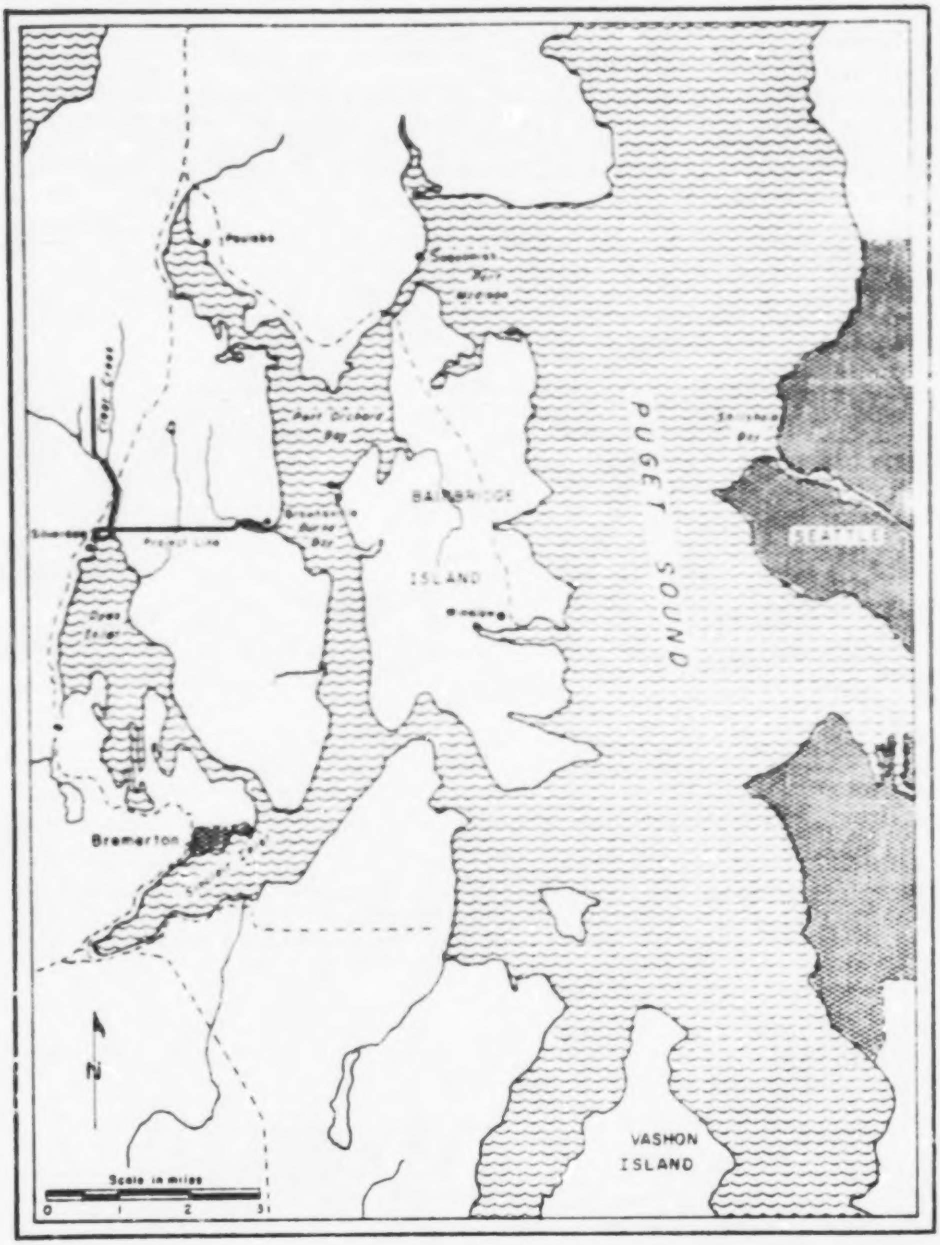

Poulsbo
Suquamish
Port Madison
Clear Creek
Port Orchard Bay
Shilshole Bay
BAINBRIDGE
ISLAND
PUGET SOUND
SEATTLE
Silverdale
Project Line
Brownsville
Burke Bay
Winslow
Dyes Inlet
Bremerton
N
VASHON ISLAND
Scale in miles
0
1
2
3

Fig. 1. Project area vicinity showing location of proposed sewer system with respect to eastern Kitsap Peninsula.

The general topography of the eastern peninsula consists of broad ridges rising between main stream valleys. However, there is no evidence to suggest the kind of dissection characteristic of a dendritic drainage system. In fact, the properties of the main stream valleys and the absence of an established network of tributary streams are probably the result of prior glacial agencies.

The depth, slope, meanders, and irregular width of valleys (which do not conform to their occupant streams) all suggest that the valleys antedate their associated streams (U.S. Soil Conservation Service 1939). In this regard Clear Creek apparently shifts its channels and varies in volume dramatically, since it was observed during this survey to flow around large trees that obviously had not always been in the main channel.

Taken as a whole, the project area includes a transect of the longitudinal ridge and valley system that so characterizes the eastern Kitsap Peninsula area. Thus results obtained as a direct result of the present survey should be somewhat indicative of what could be expected in the immediate vicinity.

SOILS

The soils of Kitsap Peninsula and of the Puget Sound Basin in general were derived from glacial materials under the influence of a coniferous forest vegetation and a humid temperature climate, being most commonly ofthe brown podzolic type (Franklin and Dyrness 1973). The parent material consists of unconsolidated glacial debris (largely outwash sands and gravels) that were deposited over Miocene age formations during late Pleistocene glacial episodes.

Soils in the project area are of two distinct types those that overlie a hardpan or bedrock substrata and those developed on permeable subsoils. Representatives of the former include soils of both the Alderwood and Edmond series, while the latter includes representatives of the Everett, Indianola, and Kitsap series.

Indianola loamy sand and Everett gravelly loam predominate both in the Silverdale vicinity and along Bucklin Hill Road. The most striking features of these soils are their porosity and mildly acidic surface horizons. The small areas of Edmonds fine sandy loam found in the project area are characterized by high organic content and an associated high water table; those Edmonds loams occurring near Silverdale also contain a large amount of gravel which results in further poor drainage.

Alderwood loamy sand is found in the Brownsville area around the margins of Burke Bay. It is characterized by a top layer composed largely of decayed forest litter which overlies an indurated (hardpan) sandy subsoil.

The channel of Clear Creek and its immediate drainage margins (100 – 200 feet wide) consists of undifferentiated alluvium; Kitsap silt loam being represented in the lower valley. In several areas a layer of muck or peat overlies these alluvial soils, resulting in further poor drainage. At present the alluvium is thickly forested in alder, willow, and conifers, as well as dense understory comprised of grasses and hydrous plants. The accumulation of decayed plant matter derived from this vegetative cover has resulted in a layer of woody peat as much as 8 feet thick in parts of the Clear Creek drainage; the largest bed of this type being the Rifle peat found at the headwaters of the stream.

VEGETATION

The project area is located within the Tsuga heterophylla zone (Franklin and Dyrness 1973), or the Coastal Western Hemlock zone of Krajina (1965). Douglas fir (Pseudotsuga menziesii), however, is the dominant species of the climax forest, and not the western hemlock.

Much of the surveyed land, specifically the Clear Creek Valley and broad areas between Silverdale and Brownsville, have been cleared for pasturage and other agronomic pursuits (see Fig. 2).

The virgin forest was dominantly Douglas fir interspersed with western hemlock, spruce, western red cedar, willow, alder, Oregon maple, vine maple, and madrona (U.S. Soil Conservation Service 1939). Virtually all the original timber has been removed in historic times by lumbering practices or fire. The conifers and deciduous trees both have reseeded in most cut-over or fire-scarred areas, and second growth is relatively rapid.

The thick understory is comprised of a variety of plants, many of which grow to four or six feet in height (see Fig. 3). Commonly found in the project area are salal, ferns, huckleberry, Oregon grape, rhododendron, various vines, and coarse grasses. Fireweed thrives in cleared and burned areas.

Many marshy areas on the Kitsap Peninsula are treeless, but the marsh of the lower Clear Creek supports both arboreal and herbaceous vegetation. Common marsh plants include mosses, cranberry bushes, wire grass, reeds, rushes, sedges and ferns.

Generally, conifers dominate the growth on the deep sandy soils of the Everett and Indianola series, and deciduous trees are dominant on the soils with a higher water retention capacity (e.g., the Kitsap and Alderwood series). In wetter sections such as the lower Clear Creek alder grows among evergreens, and in some such locales second growth alder is actually the dominant species.

CLIMATE

The climatic regime of the Kitsap Peninsula is temperate and oceanic, modified by the Puget Sound, the Pacific Ocean, and the Olympic Mountain Range.

Annual precipitation on the eastern side of the peninsula ranges from 30 – 40 inches, which distributed annually would be sufficient for most agricultural purposes. However, the uneven distribution of rainfall (average summer rainfall is 2.5 inches) renders it inadequate for many crops. Pasturage like that in the survey area is likely to dry out in the summer.

The possible benefits accruing from the inordinately long growing season (216 days) are negated by a disproportionate number of cloudy days, which affects crop growth.

The pastures of Clear Creek area are located on bottomlands where moisture conditions are most favorable in the summer for grasses.

The stump land adjacent to cleared fields is often used for grazing. Herbage includes native grasses and legumes as well as coarse grasses, weeds, reeds, and sedges.

In the survey region (T.25N., R.1E.) timbered areas are larger than cleared and cultivated areas, and much of the land is reverting to second growth forest.

Fig. 2. Valley of the Clear Creek, looking west.

Fig. 3. Vegetation of project area -- lower Clear Creek.

ETHNOHISTORICAL BACKGROUND

The first white man known to have arrived on the Kitsap Peninsula was the English explorer Captain George Vancouver in 1772. Homesteading of the area began some 50 years later. The earliest settlements were along the coast, leaving the interior and upland areas only sparsely settled.

The selection of sites for historic settlement often seem to have been conditioned by the same variables that determined the locations of prehistoric settlements. Evidence supportive of this postulate is seen in the project area. Prehistoric population centers were generally located along major waterways and at the heads of bays and inlets, areas now overlain by more recent cultural material.

The survey area is often not included within any of the specific tribal boundaries of ethnographically known Puget Sound native groups. It lies just east of the Twana area which centered around Hood Canal, and south of the Suquamish tribal lands. Previously recorded sites in the area have been assigned a Suquamish affiliation (Kitsap County Site Survey Records, Laboratory of Archaeology, University of Washington), and all are shell middens located on major waterways.

The aboriginal subsistence system in the area can best be described as a seasonal pattern, i.e. summer dispersal to fishing stations, hunting camps, and root and berry gathering stations, and winter clustering into larger and more permanent villages. Summer houses were temporary, while the structures occupied in winter were more substantial (Haeberlin and Gunther 1930). Villages were invariably located on the coast or along rivers and streams. The nature of these winter sites (e.g. longer duration of occupation, frequent reuse, and larger size) render this type of site more readily observable than the smaller more transitory camps associated with food accumulating operations.

The abundant wild food resources of the coastal and estuarine environment provided a large and diverse subsistence base for prehistoric as well as historic inhabitants of the region. Communities were able to lead a semi-sedentary existence relying wholly on procurement of foodstuffs without food production.

Major utilized resources included fish, sea mammals, molluscs, waterfowl, land game, roots, and berries. Economic differences between tribal groups often involved only the proportion of seafood to meat in the diet, the inland groups evidencing a heavier reliance on land game.

The seasonal pattern included shellfish gathering in the spring, gathering of roots and berries by women and hunting by men in the summer, fishing in the fall, and spending a sedentary winter in the village, with occasional forays for waterfowl (Elmendorf 1960, Haeberlin and Gunther 1930).

Four species of Pacific salmon were utilized, as well as smelt, herring, flounder, and trout.

Land game included blacktail deer, elk, black bear, raccoon, otter, beaver, mountain marmot, muskrat, hare, and mountain beaver. Sea mammals sought were seal and harbor porpoise.

Roots commonly used were those of the braken fern, wood fern, dandelion, wild sunflower, and cattail. Camas and tiger lily bulbs were also dug.

Berries commonly gathered included the salmonberry, huckleberry, blackberry, raspberry, salalberry, serviceberry, wild strawberry, and blackcaps. Occasionally gathered were wild carrots, acorns, hazelnuts, green shoots, mushrooms, and seaside arrowgrass.

Shore-gathered food included oysters, crabs, geoducks, littleneck or rock clams, and butter clams.

Most of the kinds of resources used by prehistoric and ethnographic groups are still available in the area. Changes that have taken place in the availability of resources were culturally induced and include such factors as depletion of clam beds by over-exploitation, the retreat of land mammals to more inaccessible areas, and changes in vegetation caused by deforestation and the introduction of weeds by farming.

The archaeological and ethnographic evidence indicates that if prehistoric material were to be found in the project area it would include functionally distinct sites used in the exploitation of specific microenvironments (e.g. alluvial bottomlands, bogs, and upland forests), and winter villages which are manifest as shell mounds. The shell middens as the larger, more permanent, and more durable features will be more likely to have weathered the natural and cultural degradation that is expected to have accrued since deposition.

Based upon extant ethnographic and archaeological information concerning the nature and distribution of aboriginal settlements on the Kitsap Peninsula, we would expect at least two such shell middens to occur in the immediate project area -- one on Burke Bay near Brownsville, and one on Dye's Inlet near Silverdale.

RECONNAISSANCE TECHNIQUES

Since there has been little modification of the landscape in the study area since the deposition of glacial material, derivation of its soils, and the formation of present surfaces, evidence of aboriginal utilization was expected to be visible on the surface of the ground. Consequently the assessment of the potential adverse impact that might accrue to the area's cultural resources through the implementation of the proposed sewer system could best be accomplished by an on-foot investigation of the surface (and subsurface exposures) over the project area.

The corridor for the proposed sewage system was surveyed by a reconnaissance archaeologist in December of 1974. If individual, isolated artifacts were located they were to be collected, plotted on a 7.5 minute USGS map, and catalogued. Clusters of artifacts or sites were to be plotted on existing maps and assessed in terms of their potential for contributing to the knowledge of the prehistory of the area. Recommendations were then to be formulated regarding the value of further testing, surface collection, or excavation of such sites to assure the preservation of this nonrenewable resource.

RECONNAISSANCE RESULTS AND RECOMMENDATIONS

The project area is here divided into four sectors to facilitate discussion of reconnaissance results, as the logistics involved in each were somewhat different. The sectors are:

1) Clear Creek, 2) the Silverdale waterfront, 3) the Silverdale – Brownsville corridor, and 4) the Brownsville waterfront.

1) The banks of the Clear Creek were examined from several access points for approximately two miles of its lower extent. The creek is fast-flowing and has a swampy area surrounding the main stream in the lower reaches, and more heavily-wooded banks as one moves northward. The stream presently does not flow in precisely the same channel as previously, as evidenced by large trees growing in the current flow.

   The tendril-like conformation of the stream flowing through marshy and heavily-wooded areas may have prohibited occupation on its shores; i.e. swampy conditions, varying (though adjacent) channels, and flooding, as well as dense vegetation are inconducive to any but sporadic and temporary use of the banks. If these conditions obtained prehistorically, they would have rendered aboriginal occupation unlikely. If, on the other hand, the vicinity of the stream was more hospitable in the past, then any evidence of occupation or utilization has been eradicated by the current characteristics of the creek.

2) Examination of the Dye's Inlet beach where the smaller fork of Clear Creek enters the bay showed evidence of considerable fill and dredging, and no aboriginal material was visible. Where the main stream of Clear Creek enters the inlet the stream is ponded and conducted by pipe under Bucklin Hill Road. Again filling and/or dredging operations have erased any evidence of prehistoric activities.

3) Survey of the Silverdale – Brownsville corridor involved the inspection as an existing ditch that parallels the Bucklin Hill Road on its north side. The trench proposed for implantation of the sewer line presently contains a water main as well as buried cable, and thus yielded only modern debris.

4) Inspection of the Brownsville waterfront resulted in the location of a shell heap on Burke Bay (site 45-Kp-17) in the vicinity of the existing marina. Historic and modern activities have all but obliterated the mound, and only a thin layer of shell and fire-cracked rock is visible. This material is scattered over the beach front and into the water. A test pit of approximately 1.5 meters square was previously dug in the midden, and investigation of this pit revealed the vertical extent of the debris to be shallow (less than .5 m). The upper part of the mound is reported to have been bulldozed. The horizontal extent of the site is indeterminate, as the inland side has been obscured by modern dwellings and road building and the bay side has been dredged and/or aggraded.

The judgement of the investigating archaeologist is that the value of cultural information forthcoming from further work on 45-Kp-17 is dubious, and such investigation is not recommended at this time. It is suggested, however, that an archaeologist be present at any future dredging operations in the vicinity of the site.

It is further judged that implementation of the proposed sewer line will have no negative effects on cultural resources in the project area. If artifactual material is encountered during the course of the construction, personnel should contact the Office of Public Archaeology in Seattle, Washington to insure proper documentation and disposition of artifacts.

BIBLIOGRAPHY

Elmendorf, W.W.

1960 *The Structure of Twana Culture.* Washington State University Research Studies, Monographic Supplement No. 2. Vol. XXVIII. No. 3.

Franklin, Jerry F. and C.T. Dyrness

1973 *Natural Vegetation of Oregon and Washington.* USDA Forest Service General Technical Report PNW-8.

Gunther, Erna

1973 *Ethnobotany of Western Washington.* University of Washington Press. Seattle and London. Revised Edition.

Haeberlin, Hermann and Erna Gunther

1930 *The Indians of Puget Sound.* University of Washington Press. Seattle and London.

United States Soil Conservation Service

1939 Soil Survey for Kitsap County, Washington. Series 1934, No. 12.

APPENDIX H

ENVIRONMENTAL IMPACT SUMMARY SHEET FOR PROPOSED HANSVILLE ROAD SOLID WASTE DISPOSAL SITE

Title of Proposed Action	Proposed Hansville Road Solid Waste Disposal Site
Nature of Report:	Draft Environmental Impact Statement
Sponsor:	Board of Commissioners Kitsap County Kitsap County, Courthouse Port Orchard, Washington 98366
Type of Action:	Administrative
Summary of Action:	Construction, maintenance and operation of the existing Hansville Road disposal site and proposed expansion as a sanitary landfill to serve northern Kitsap County. Proposed action includes existing 60-acre site plus proposed 20-acre expansion.
Summary of Impacts:	
• Land Form:	Alteration of existing topographic features to provide ultimate grade of three percent.
• Soils:	Disturbance of existing soil with reuse as compacted cover for landfill operations.
• Water Resource:	Potential impact from leachate to be mitigated through collection and disposal.
• Vegetation:	Removal of existing, on-site vegetation consisting of second growth conifers, deciduous varieties and

underbrush and grasses indigenous to the local area to be mitigated through application of a new vegetative cover upon completion of landfill operations.

- Wildlife & Habitat: Conversion of the existing natural habitat with native fauna to a manmade habitat. Ultimately, new biological regime will develop if filled area is not used for human-use activities.
- Air Resource: Use of a sanitary landfill operation reduces potential for fire and, therefore, potential impact on air quality.
- Land-Use: Use of the proposed site is compatible with the existing on-site zoning (agriculture). Property acquisition of the additional 20 acres finalized and may not be necessary.
- Noise: Potential acoustical impact from on-site machine noise to be mitigated through both distance to closest receptor and provision for a timbered buffer zone at site boundaries.
- Aesthetics: Potential visual impact to be mitigated through use of a timbered buffer zone at site boundaries. In addition, conversion of existing modified landfill operation to sanitary landfill will reduce airborne material and litter on-site.
- Health and Safety: Conversion of existing modified landfill operation to a sanitary landfill will minimize potential health and safety problems associated with solid waste disposal.
- Area-wide Effects: Project will tend to concentrate traffic on nearby roadways, though this impact is expected to be minor.

Project will allow for orderly development through provision of a needed public service, solid waste disposal.

Implementation of County-wide Comprehensive Solid Waste Management Plan will increase the cost of refuse disposal to the public.

APPENDIX I

SUITABILITY OF SOILS FOR LAND DISPOSAL OF EFFLUENT

The combination of climate and soils in the study area makes the possibility of land disposal of wastewater effluent rather restrictive. In the main, this is due to the water budget which prevails in the area, as shown on Table I-1 with data pertaining to Grapeview, whose natural setting is somewhat similar to that of the study area. The root zone water-holding capacity of the soil-vegetation groupings in the study area falls largely in the mid-region between the two extremes shown on Table I-1. Thus, the amount of wastewater effluent that can be applied to the soil for disposal by evapotranspiration is only about seven inches per year, requiring over 8,000 acres for the projected 5.3 mgd of wastes generated in the area in the year 2000. Furthermore, the effluent would need to be stored during the period of water surplus, in structures with adequate capacity (nearly one billion gallons). For this type of disposal, nearly all soils in the area except for those with steep slopes, poor drainage and high erosion hazard can be utilized.

Another possibility worthy of consideration is year-round disposal of wastewater effluent at higher rates than can be absorbed and consumptively used in the water deficit period. Depending on application rates and scheduling, a portion of the wastewater effluent, filtered through the soil and treated by the biological, chemical and physical reactions in the soil, accrues to the groundwater. The level of groundwater table --both perched and confined--is rather high in many parts of the study area. In the southern extremity of the area confined groundwater is under artesian pressure, and in the northern parts static water depths in some of the drilled wells exceed 100 feet. There are great variations in groundwater depth due to the rather uneven distribution of the various layers of glacial till aquifers in different parts of the study area. Hence, the importance of the existence of an adequate thickness of unsaturated materials in the land disposal area should be borne in mind in the selection of a site for land disposal of wastewater effluents.

As far as soil properties are concerned, those without a hardpan can generally be considered to be suitable, as long as application rates, scheduling and irrigation method used are adapted to the existing soil and vegetation requirements. Soils that can be utilized for land disposal of effluents include Indianola loamy sand (Is), Kitsap silt loam (Ks) and the undifferentiated alluvial soils (A), as shown in

Table I-1. MEAN ANNUAL PRECIPITATION, EVAPOTRANSPIRATION AND WATER BALANCE WITHIN SOIL ROOT ZONE [a, b]

(cumulative depth of water per year)

Parameter	Soil (root zone) water-holding capacity [c]			
	10 in.	(25 cm)	2 in.	(5 cm)
Precipitation, in. (cm)	51.98	(132)	51.98	(132)
Potential evapotranspiration, in. (cm)	26.48	(67)	26.48	(67)
Actual evapotranspiration tion, in. (cm)	21.77	(55)	16.93	(43)
Soil moisture recharge/ utilization, in. (cm)	6.83	(17)	1.99	(5)
Water deficit [d], in. (cm)	4.71	(12)	9.55	(24)
Water surplus [e], in. (cm)	30.21	(77)	35.04	(89)

[a] Adapted from "Water Supply Bulletin No. 18," Division of Water Resources, State of Washington, 1965.

[b] Data relate to Grapeview, Mason County, with similar natural setting to that of the study area.

[c] Water-holding capacity for a given soil is mainly a function of soil texture, soil depth limitations, plant rooting depth, soil structure and organic matter content. In the study area, water-holding capacity varies between 4 and 8 in. in most areas. Extremes are presented for ready application to all soil-vegetation combinations.

[d] This is the amount of water which plants could consumptively use in addition to the amount naturally available during May, June, July, August and most of September.

[e] This is the amount of water which exceeds the ability of plants to transpire and soils to absorb from late September through April.

Figure I-1. Existence of continuity between surface and ground waters is not used as a limiting criterion to land application in Figure I-1 and must be considered independently.

Soils as a Natural Resource

Soils in the study area presently support a vast variety of natural vegetation, including evergreen and deciduous forests, meadows and pastures, as well as Christmas tree farms and a minor area of other agricultural activities (poultry and dairy farms, etc.). The soils with hardpans are somewhat less productive than those with friable subsoils due to the restrictions that the former soils impose upon root penetration. Generally, most of the soils are of limited agricultural value. Soils in the study area are classed into standard productivity or capability units, briefly described in Table I-2.

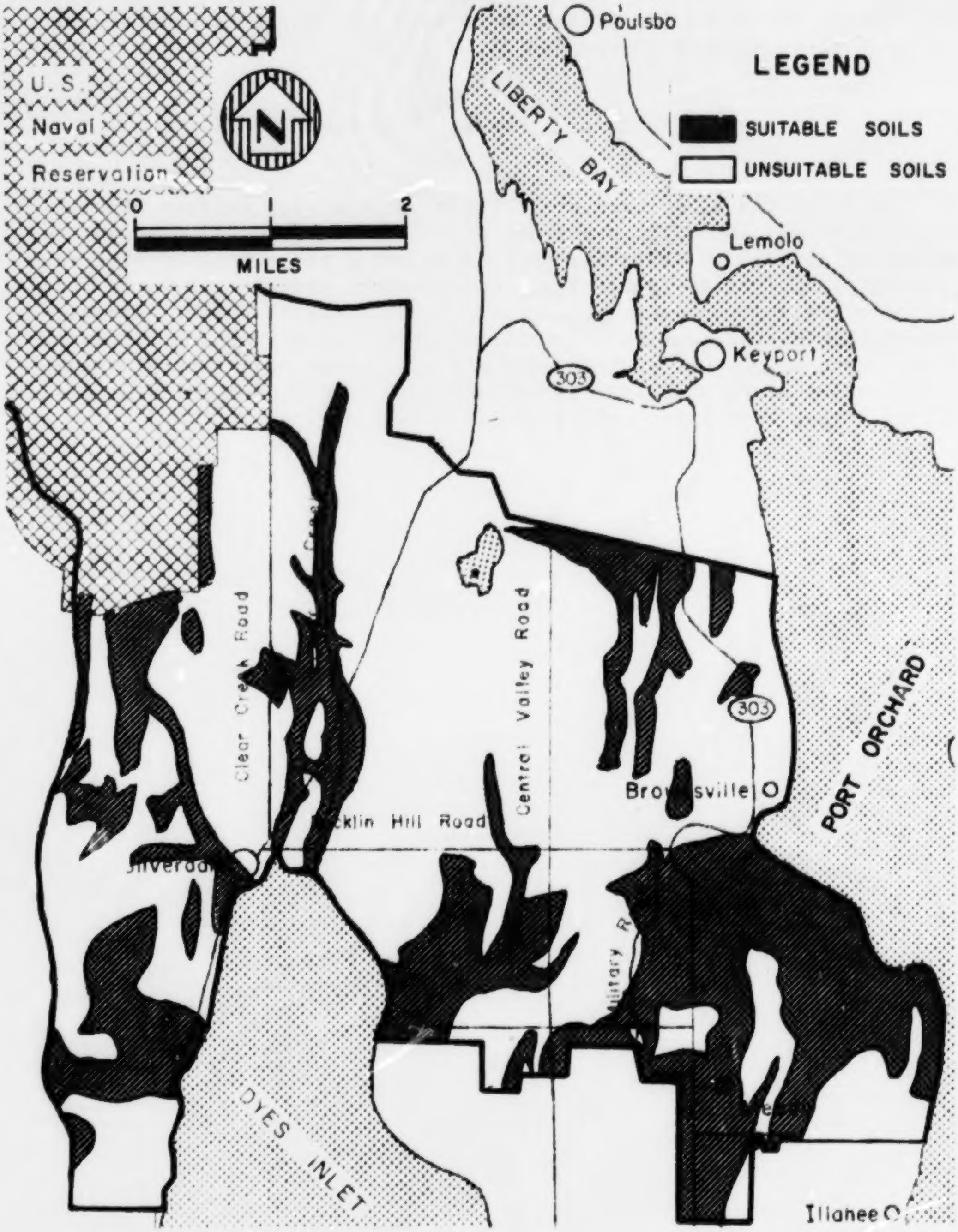

Poulsbo
LEGEND
■ SUITABLE SOILS
□ UNSUITABLE SOILS
U.S. Naval Reservation
N
0
1
2
MILES
LIBERTY BAY
Lemolo
Keyport
303
Clear Creek Road
Central Valley Road
303
Bro sville
PORT ORCHARD
cklin Hill Road
ilverda
Military R
DYES INLET
Illahee

Figure I-1. Soils suitable for high-rate water application

Table I-2. LAND CAPABILITY CLASSIFICATION OF SELECTED SOILS IN KITSAP COUNTY [a]

Soil Series	Surface texture	Map symbol	Capability class [b]	Agricultural value	Agricultural limitations	Portion of study area, %
Alderwood	loamy sand	As	VIIe	very poor	severe erosion hazard	15
Alderwood	fine sandy loam	Af	IVe	fair	moderate erosion hazard	35
Alderwood	loam	Al	VIIe	very poor	severe erosion hazard	1
Alderwood	undifferentiated at this time					25
Edmonds	fine sandy loam	Ef	IIIw	potentially high	-	1
Indianola	loamy sand	Is	VIs	fair to poor	moderate erosion hazard	15
Kitsap	silt loam	Ks	IIIe	generally high	moderate erosion hazard	6
Alluvial	(undifferentiated)	A	-	variable	variable	5
Muck	organic	Mu	IIw	potentially high	severe flooding hazard	1
Rifle Peat	organic	Rp	IIw	potentially high	severe flooding hazard	< 1

[a] Adapted from USDA-SCE "Interpretation of Soils for Land Use Planning," January 1972.

[b] USDA-SCS's standard classes and subclasses, briefly interpreted in the next two columns.

APPENDIX J

MODELING OF WASTE DISPOSAL SITES

To relate effluent quality and the water quality standards, it is necessary to consider the mechanisms that affect marine wastewater disposal. Discharged wastewater, being less dense than the surrounding ocean water, ascends from the point of discharge in the form of an expanding plume. As the wastewater rises, it mixes with the adjacent ocean water until the density of the wastewater-ocean water mixture becomes equal to the density of the surrounding ocean water.

Dilution effected during this process is called initial dilution and results from the mixing induced by the dissipation of energy as the initial and buoyant momentums of the discharged wastewater are exhausted. The degree of initial dilution depends on the diffuser design, the height of the rising plume, and the rate of transport of diluted wastewater away from the area above the diffuser. The rising plume may stabilize at or below the ocean surface, depending on the discharge depth and the prevailing density structure of the ocean. As the wastewater-seawater field moves away from the discharge point, it is subject to further dilution due to horizontal dispersion. Concentrations of nonconservative waste constituents are still further reduced by decay or disappearance.

Because the purpose of the diffuser system is to induce rapid mixing of effluent with seawater in order to minimize the possibility of contact between marine organisms and high concentrations of wastewater, it is apparent that the initial dilution is the most important of the diminution processes. Effective initial dilution depends on two phenomena: rapid momentum-induced mixing of wastewaters with seawater, and transport of clean dilution water across the site. The former phenomenon can be controlled by the system designer, provided an adequate depth of water exists, while the latter is an uncontrollable natural characteristic of the discharge site. In general, it is the latter phenomenon that controls the degree of initial dilution obtainable at a specific site.

Once initial dilution is completed, further waste concentration dimunition depends on horizontal dispersion and decay mechanisms. For waste constituents that do not decay rapidly, the degree of flushing or residence time of waters within the boundaries of the receiving area determines the steady-state concentrations of waste constituents that will remain.

Thus it becomes apparent that with respect to both initial dilution and horizontal dispersion a key issue in comparing candidate sites is the degree of mixing that occurs at each site. Another key issue--the relative sensitivity of the biological community in the discharge area--is considered elsewhere in this report.

In the course of facilities planning activities, three models were used to study water quality and mixing within the study area. A mathematical ecologic model applied by EPA to a part of Puget Sound, the University of Washington's physical model of Puget Sound and mathematical dispersion model used by Parametrix, Inc. Each of the models is described briefly below, together with a discussion of its limitations and the conclusions regarding a comparison of potential discharge sites that can be drawn from its use.

The Ecologic Model

A mathematical model was used to simulate and link together ecologic succession from primary producers through successively higher levels in the marine environment. The ecologic model was combined with a hydrodynamic model in order to predict water quality and biological characteristics that might occur as a result of waste discharge.

Due to limitations in the data base for verification and the fact that the relationships between different trophic levels are only poorly understood, the model is of limited use in simulating the effects of waste discharge upon water quality and biological characteristics in Puget Sound at the present time. To quote the modeling report "The ecologic model.....can only be considered as a preliminary tool for evaluating water quality effects of waste discharge upon Port Orchard. The simulations.....should be evaluated principally in terms of relative effects." In addition the treatment/regionalization strategies tested in the model are broad in scope and do not correspond directly with the alternatives for Central Kitsap County. For these reasons it is concluded that the ecologic model is of little or no value in comparing outfall sites for Central Kitsap County.

The Physical Model

The second model used in the study was the University of Washington hydraulic model. The final report on the hydraulic model studies of the possible outfall locations within the Port Orchard System and its connecting passageways and inlets was submitted to the URS Company in November 1975. Some measurements of water movements in the field were made with vessel-mounted current meters and drogues in order to verify the model results.

The study area for the physical hydraulic model encompasses an area about 12 miles wide, from the edge of Dyes Inlet eastward to Point Jefferson, and about 16 miles long, from Sinclair Inlet eastward to Point Jefferson and beyond. Given the horizontal scale ratio for the Puget Sound model, this area represents a rectangular grid 19 inches wide by approximately 25 inches long. Hydraulic modeling of such a physically small area can give erroneous results if extensive care is not taken to assure precise measurement of all controllable parameters. Vertical and horizontal scale ratios were adjusted to reduce possible side effects of surface tension and laminar flow, thus producing better results. In general, model results can be regarded as accurate, but there are limitations to this model which lead to questionable results from some of the outfall locations studied.

There are three major limitations of this model which cannot be avoided. Because of the effects of surface tension and land topography it was not possible to incorporate the effects of wind into the modeling of the study area. Winds and the waves caused by winds contribute significantly to mixing. Surface drag between wind and water interfaces can modify tides, surface transport of the effluent and water exchange processes.

Surface tension is also an important factor in the scaling of any large body of water with a relatively shallow depth. Its effects strongly influence water movement in shoals or near the shoreline, especially in areas where current velocities are low enough that the water in the basin remains relatively undisturbed. As a result of surface tension, estimations of current velocities are unreliable where real tidal currents are weak.

Viscosity is another factor that cannot be scaled; thus, the possibility of laminar flow in the model exists where turbulent flow actually occurs in the area under consideration. This limitation, like that relating to current velocity, is due to scale effects of the model.

The summary of results contained in the modeling report include the following statements:

> "Model observations showed that discharge of waste into the main basin of Puget Sound is more desirable than discharge into the Port Orchard system."
>
> "The central portion of Port Orchard channel was shown to have a low net transport and slow flushing in the absence of winds."

The Dispersion Model

A third model, a mathematical model of dilution and dispersion at three potential outfall sites, was developed for URS by Parametrix, Inc. and reported on in November 1975. The three sites modeled were Dyes Inlet, North Port Orchard and Point Monroe. This model aggregated several mathematical models of dilution and dispersion and used them as a means of calculating the dilutions that would occur if waste were discharged at each site and if water movements and density structure were as measured by the University of Washington during the summer of 1975.

The principal limitation of the model stems from the fact that the mathematical formulations on which it is based derive from experiments conducted in laboratory tanks which provide a simplified simulation of reality. The methods used to take account of water movements is not entirely satisfactory. In addition the information used as an input to the model may not be representative of worst case conditions.

The use of the model led to the conclusion that dilution at a Point Monroe discharge would be 2 to 4 times greater than at a Port Orchard discharge.

Conclusions

The modeling studies in general support the conclusion that dispersion at Point Monroe is greater than in Port Orchard Channel, a fact that might be expected in view of the relative exposure to large-scale water movements of the two sites.

It is apparent, however, that a discharge at either site will comply with the applicable water quality standards. Thus, any further analysis of the sites should focus on the costs and benefits associated with the higher degree of dispersion obtainable at Point Monroe.